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WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

The Annual Meeting of the Association will be held at the Tremont House, Boston, on Wednesday, the 16th day of February, at 12 o'clock, M.

GEO. B. NEAL, Secretary.

BOSTON, Jan. 15th, 1876.

PRICE OF GAS.

From various quarters we are receiving information of the reduction in the price of gas. To the consumer this is very gratifying news; but the great trouble seems to be to get the price low enough to suit them. We announced in our last that in the city of Brooklyn the companies had all reduced the price from $3 to $2·75, and still the complaints now seem to be that the companies did not come down lower. There are always a large number of persons in every community who are "never happy unless they are miserable" about something. These are apt to be people of lively imaginations, and sanguine temperaments, who are always ready to believe everything they hear, provided it is *not* favorable to their present condition. The reports that *thousands* of meters have been returned to the gas companies are easily believed and assiduously circulated by them notwithstanding the fact that a moment's reflection would satisfy any man that the less the consumption of gas, the more difficult it becomes for the companies to reduce the price. The companies must maintain the same plant as they now have, even if their consumption should be reduced one-third or one-half; and, hence, the reduction in total product would increase the cost per thousand.

This is one reason why companies with a small send out, cannot make gas as cheaply as those with a large one, and a small works cannot be expected to furnish to consumers at as low a rate as the largest ones. Hence, what is to be gained by any effort to induce people to discontinue the use of gas and adopt oil. With kerosene at 18 or 20 cents a gallon at retail, there is no competition strictly speaking between the two, for all must admit that, considering simply the dollars and cents paid out, kerosene is the cheaper. But is it simply a question of *cost* only? Is not the quantity of light, the safety, the cleanliness, the comfort, the convenience and the healthiness of a good gas-light, properly burned, to be taken into account? We must say, yes. When we reflect that in the year 1874 it has been estimate that upwards of 3,000 lives were lost, in consequence of kerosene explosions—it must be admitted that there is an element of danger in the use of kerosene.

It is not to the superiority of kerosene that the falling off in gas consumption is to be attributed. The country has been, and in fact still is, passing through one of the most severe and protracted trials that it has ever experienced. The force of gravitation seems to be the only force at work. Everything is tending towards what many call "hard bottom." Fortunate are those who can stand the shock of stopping when they get there. Every industry has been made to feel the shrinkage. Thousands are without employment. It becomes an absolute necessity to stop expense—Money, "though cheap in the market," is hard to get. Gas bills come regularly, and if they can't be met the meter must go in. Here is the cause of reduced consumption—gas companies cannot expect to escape the dullness of the times. They, too, must economize, and reduce the cost of their product to the lowest possible figure, and share the burden of the consumers by doing what they can to reduce its cost to them. It is not the time for increasing dividends. True policy would seem to dictate that if it is possible to meet the demand for a reduction it should be done. How to do this is a question for every gas manager to determine for himself according to the circumstances surrounding him.

Improved methods of manufacture and purification, the increase of the value of residual products resulting therefrom, the stopping of leakage, and proper regulation of pressure are points which should be carefully studied. But of all other points we believe that the *burner* is the point where the consumer suffers the most. The gas goes through but it is not burned properly. The company should furnish proper burners, and do it at such a price as would make their burners the *cheapest* as well as the *best*.

PURIFICATION.

Perhaps there is no point in gas manufacture to which our cousins on the other side the water are giving so much attention as to the purification of their product. On January 3d we gave our readers the benefit of some suggestions by Mr. Anderson upon this subject, and we hope in our next to give still further his views in relation to it. In the communicated article in another column, we lay before our readers some facts in actual experience. The manner in which they

are stated is sufficient evidence of the ability of the writer to treat upon the subject in hand, and in it we see a confirmation of the fact that we do not get all the benefit we might from what is too often treated as a *waste* product.

Very often the only object seems to be to get the gas condensed as rapidly as possible, then to wash it out thoroughly and crowd it to the purifying boxes, leaving them to bear the brunt of the work, and then complain of the small quantity of gas purified to the bushel, wondering that the gas is not clean and that naphthaline chokes everything.

Here we have a case where it is clearly shown that too much water worked badly–that by using the ammonia-liquor over again the lime was able to increase its usefulness from two to seven—and the waste product was good for something. The writer of the article is what we call a practical gas manager, *i. e.*, one who, having informed himself upon the true theory of the operations of which he has charge, is able to put his theory into practical use and obtain the results that his theory demands.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

This is a paper just established, in Boston, by Messrs. Jas. R. Osgood & Co., and, as its name would indicate, is devoted to the architectural interest. It is very handsomely printed, and each number is illustrated by engravings—done by the heliotype process—representing some of the best models of private and public buildings. The design of the paper is to educate the people in true architecture, and there is no doubt that it will have a wide influence in correcting and improving much of the very bad style of building in our country. We often see very large and costly buildings, erected at great expense, but utterly devoid of beauty. It costs no more to build correctly, and in good taste, than it does to patch up and render distasteful our homes and our places of business.

The architect has come to be acknowledged as a member of a distinct profession, just as much as the lawyer and the physician ; and we bid God speed to this new undertaking. which, from the well-known character of its founders, we are confident is destined to have a great and beneficial influence upon the Architecture of our land.

How to Keep the Journal.—We call the attention of our readers to an advertisement in another column relating to the Binder for preserving the Journal. The usefulness of this article has been fully demonstrated, and it possesses the advantages claimed for it. We desire to make The American Gas-light Journal worth keeping, and if the paper is preserved, by properly filing it, reference can be easily made to any number at any time. We would again invite those engaged or interested in gas manufacture to furnish us with items of interest that may come within their knowledge at any time. Every day facts and experience are always useful, interesting and instructive.

Van Nostrand's Engineering for January.—This magazine continues to maintain its well-deserved reputation, and with this number it commences its xivth volume. Among its original articles we notice the following:—

Arcs of Adjustment—For Flattening the Extremities of Railroad Curves, by N. B Putnam.
Note on the Determination of the Magnetic Meridian, by L. Wagoner, C. E.
Baie Verte Canal, by Thomas Guerin, C. E.
On the Conditions and Prospects of Architecture in the United States, by William Fogerty.

Besides these there are selections from the best magazines of the day which are of interest to the civil engineer and general reader.

In another column we give an extract of Mr. Woodall's report on the gas of Leeds, England, and a communication relating thereto from Mr. D. Bruce Peebles, of Edinburgh. The facts there stated are worthy of study and application.

HEAT-UNITS. II.

In our article on this subject, in the issue of December 16th, we gave a portion of the paper by Mr. Richard Akerman, of the Stockholm School of Mines, as translated for *Iron*. It was our intention to have continued the subject, but a press of other matter has prevented. In the article referred to a "Heat Unit," and "Calorimetic Heating Effect," were fully defined. By the latter is meant the heat developed when one substance enters into chemical combination with another. The heat unit is the unit of measure for expressing the calorimetric heat of the substance in question in relation to the other substance with which the combination takes place ; and by a *heat-unit* is meant the quantity of heat required to raise the temperature of one lb. of water one degree of the Centigrade thermometer. We now proceed to give the definitions of other terms, as expressed by Mr. Akerman in his valuable paper :

Difference between Temperature and Quantity of Heat.—It is of the greatest importance to distinguish accurately between the quantity of heat or the number of heat-units obtained and the temperature or measurable heat which a body possesses. If, for example, a vessell contains 10 lbs. water of a certain temperature, say 15 deg. Centigrade, this water possesses 150 heat-units over the freezing point, and if 2 lbs. of this water is taken away, the residue remaining in the vessel has still the same temperature, but only possesses 120 heat-units, the other 30 heat-units accompanying the water which was removed. For the temperature or measurable degree of heat of any substance depends not only on the quantity of heat communicated to it, to which it is in direct proportion, but also on the quantity or weight of the substance in question, to which it is in inverse proportion.

Specific Heat.—But even if the same quantity of heat (the same number of heat-units) is communicated to two different substances, they do not acquire the same increase of temperature, and the reason of this is that the specific heat of different substances is not the same. By the *specific heat* of a substance is meant the number of heat-units which must be communicated to a *weight-unit* (1 lb.) of the substance in question in order to raise its temperature 1 deg. Cent. It thus follows from the definition of a heat-unit given above that the specific heat of water must be 1, but if on the other hand 1 lb. of another substance would require two heat-units to raise its temperature one degree, its specific heat would be two. By the specific heat of oxygen being 0·2182 is, therefore, understood that only 0·2182 of a heat-unit is required to raise the temperature of one pound oxygen one degree. From all this it ought to be easily understood without further explanation that, in order to judge correctly of the amount of heat belonging to a substance, we must know not only its *temperature* but also its *weight and specific heat* and that the quantity of heat communicated to the substance in question is just determined by means of the *product* of *these three figures.*

The Heat of Fusion and Vaporisation.—Finally, perhaps, it ought also to be mentioned that by the heat of fusion is understood the number of heat-units which is taken up by a weight-unit of the substance in question when it is brought from a solid to a fluid condition, and by the heat of vaporization the quantity of heat which is taken up when a heat-unit of a fluid substance is converted into a gas or vapor."

Prof. Akerman states that the calorimetric heating effect of iron, per weight unit of oxygen, is to be taken at 4205 heat-units—and then continues as follows :—

Let us now, with the assistance of these data, see what is the calorimetric heating effect of carbon per weight-unit of oxygen taken up during its burning to carbonic oxide. As the heating effect of carbon per weight unit of itself on being burned to carbonic oxide, is 2473 heat-units, and one equivalent (six weight-units) of carbon is in this case combined with one equivalent (eight weight-units) of oxygen, the calorimetric heating effect of carbon when burned to carbonic oxide per weight-unit of the oxygen taken up, must amount to 2473x6 : 8=1854·75 heat-units.

By a similar deduction we find also that the calorimetric heating effect of burning carbonic oxide to carbonic acid per weight-unit of oxygen taken up, amounts to 4205·25, for in this case one equivalent (6 + 8 = 14 weight-units) carbonic oxide combines with one equivalent (eight weight-units) of oxygen, and as the heating effect of carbonic oxide per weight-unit of itself is estimated at 2403, the figure sought must be 2403 + 14 : 8 or 4205·25 heat-units as just stated.

The figures by which the relations of heat in the reduction of iron ore by means of carbonic oxide and carbon are determined, may thus be taken to be the following :—

The calorimetric heating effect of carbon when burned to carbonic oxide per weight-unit of oxygen is 1,855 heat-units.

The calorimetric heating effect of carbonic oxide when burned to carbonic acid, per weight-unit of oxygen is 4,205 heat-units.

Iron's calorimetric heating effect per weight-unit of oxygen, 4,205 heat-units.

The Calorimetric Heating Effect, Specific Heat, &c.. of Various Substances.—Before we enter upon the calculations themselves we may, in conclusion, state some figures which are required for them.

The calorimetric heating effects per weight-unit of the substance entering into combination with oxygen have been taken to be :—

			Heat-units.
For Carbon when burned to		Carbonic acid	8080
,,	,,	Carb. oxide..	2473
,, Carbonic oxide	,,	Carbonic acid	2403
,, Hydrogen	,,	Water.....	29638
,, Silicon	,,	Silica.....	7830

The calorimetric heating effect per weight-unit of caustic lime on combining with carbonic acid has, according to Schinz, been taken 197·1 heat-units.

London Water.—Each house in London is supplied with a tank of a regulated size, and each morning a man comes along and turns on the water from the street main until this tank has time to fill, and then turns it off again until the next day. Of course standing thus all day, especially in summer and where ice is an almost unknown luxury, it becomes very insipid for drinking purposes. But that makes no difference to the average Londoner. He rarely drinks any water any way!—*Iron Age.*

[Original Communication.]

WRITTEN FOR THE AMERICAN GAS-LIGHT JOURNAL.

An Accident in the Purification of Gas.

An accident happened in the purification of our gas, during November, 1875, that suddenly interrupted the order of the works, and caused unusual trouble and anxiety, as it was nearly impossible, with daily and sometimes semi-daily changes of the purifiers, to keep the gas clean. It was some time before we discovered the cause of the difficulty; and, as a similar trouble may arise at other works, I am induced to give an account of our perplexity, brought on by carelessness, that, from a knowledge of it, others may in some degree perhaps be benefited, and be kept from what might, under certain circumstances, prove a serious matter.

The following is the order of our purification:

The gas after leaving the hydraulic main goes into the condensers, which are underground, and consist of 10 and 12 inch pipes placed about three feet below the surface of the ground. The condensing surface per thousand cubic feet per hour, varies from a maximum, in July, of 540 square feet, to a minimum of 200 square feet in December.

The gas was delivered from the condenser to the washers, in November, at an average of 73°F., the average temperature of the atmosphere being 35°F. The two washers are vertical, cast-iron boxes, 17'9"high, and 4' square, with a vertical cast-iron plate dividing them in two parts, thus making practically four divisiona—17'9" high, 4' wide, and two feet deep. Each of the two divisions of these washers is divided equally from top to bottom with 13 projecting cast iron plates, 18 inches wide, placed at an angle of 30°.

It has been our practice for years to wash the gas in the first washer with the gas liquor, the same being pumped every twenty-four hours from the tar-well, and then pumped up and down through the washer for 24 hours, after which the liquor is worked up into the sulphate of ammonia. In the second washer fresh water is used so as to remove the ammonia in such quantities that the boxes may be endurable. The practice has been to use from 20 to 30 gallons of gas liquor in the first washer, and about 3 gallons of fresh water in the second washer, to the 1000 cubic feet of gas.

On Nov. 8 the pump on the gas liquor began to run badly, and, in a day or two afterward, was taken apart for repairs. The man in the purifying house increased the shower of fresh water in the second washer, that the men might not be inconvenienced in cleaning the boxes. Not less than 30 gallons per thousand cubic feet of gas of fresh water were turned on.

Our last purification is by the dry lime process —the hydrate of lime being wetted, mixed with coke breeze, in the proportion of 92 per cent. lime and 8 per cent. breeze. The bushel is measured, as we receive it slaked from the kiln, on our purifying room floor—we call 2150 cubic inches a bushel—which weighs, on the average, 47 lbs. The mixture of lime, breeze, and water ready for boxes, weighs 57½ lbs. per bush.—43·24 lbs. being lime, 2·92 lbs. being breeze, and 11·34 lbs. being water, therefore, the number of gallons of water in mixture is 1·35.

Our purification from Nov. 1st to Nov. 8 was a little over 6,000 cubic feet to the bushel of lime.

After Nov. 8, or from Nov. 10 to Nov. 17th, our average purification, using the same coals as before, was 2773 cubic feet per bushel of lime. Even with this liberal use of lime it was nearly impossible to keep the gas clean. The boxes whe opened were quite clean and fresh, and the lime looked nearly as white as when put in.

From Nov. 17 to Nov. 25, we changed centre-drum, tested the passage of the gas through the boxes, increased the quantity of lime in the boxes 53 per cent., made eudiometrical examinations for SH_2 and CO_2 (a quick but unsatisfactory method) of the gas from the inlet and outlet of washers, and the inlets and outlets of the boxes. For about 12 hours the water was increased in the second washer, the two boxes next changed gave a purification of but 2080 cubic feet to the bushel. Two days after putting in the additional water we shut it off entirely and put in the gas liquor in both washers. From this time to the present, about five weeks, we have had no trouble, and the purification has averaged a little over 6,000 cubic feet to the bushel of lime.

THE CAUSES OF THE ACCIDENT

were, I think, two in number—

First, and the more important. The SH_2 and CO_2 came into the boxes almost entirely free from NH_3, and the efficiency of the lime in combining with these impurities is much greater in the presence of NH_3 than if it be removed.

You will find a confirmation of this fact in "Chemistry of Gas-Lighting," Dr. L. Thompson, p. 94: also in "De L'Eclairage au Gaz," E. R. D'Hurcourt, p. 287: also in "Traite D'Eclairage par le Gaz," Dr. Schilling, p. 74.

Second. The fresh water removed the NH_3, but absorbed but little of the SH_2 or CO_2, letting it pass in more than the usual quantity to the purifiers.

At the risk of being tedious I would attempt to explain; and, since I have not been able to find any detailed figures in relation to the combination between the lime and foul gases, I would submit my own in the hope that they may be useful.

The gas from ordinary Newcastle coal contains at the outlet of the condenser about 2½ per cent. of CO_2, and eight-tenths of one per cent. of SH_2 ("Chem. of Gas-Lighting, p. 34.) If by washing and scrubbing the CO_2 could be reduced to one per cent., and the SH_2 to three-tenths of one per cent., the lime in the purifiers would be fouled much less quickly than if all the work was thrown upon it.

Assuming the reduction in volume as possible, there would be, in every thousand cubic feet of gas at the inlet of purifiers, 10 cubic feet of CO_2, and three cubic feet of SH_2, weighing respectively 8050 and 1858 grains. These impurities combine with the lime, theoretically, about as follows:

1st. The SH_2, which is 94·7 per cent. S and 5·3 per ct. H. The 1759 grains of S combine with the Ca of the CaO (which consists of 71·4 per cent. Ca and 28·6 per cent. O), to form CaS (55·5 per cent. Ca and 44·5 per cent. S.) It requires 2193 grains of Ca to saturate the 1759 grains of S to make 3952 grains of CaS. This 2193 grains of Ca, in combination with O, make 3071 grains of CaO to saturate the 1759 grains of S. Part of the 99 grains of H combine with the O of the CaO to form OH_2.

2d. The CO_2, weighing 8050 grains, combines with the lime to form CaO CO_2 (56 per cent. CaO and 44 per cent. CO_2), making 18295 grains, which is equivalent to the saturation of 10245 grains of CaO.

Therefore—

3071 grs. of CaO are saturated by 3 cu. ft. of SH_2, &
10245 " " CaO " " "10 " " CO_2
making
13316 " " CaO or 1·90 lbs.

The lime being in the form of CaO OH_2 (75·6 per cent. of CaO and 24·4 per cent. OH_2) it would require 2·51 lbs. of hydrate to remove the impurities, if they exist as above, in 987 cubic feet of gas, as measured by the station meter. A bushel of lime, weighing 47 lbs., would therefore be equal to the saturation of the impurities in 18478 cubic feet of gas. But if the gas went to the purifiers with none of the CO_2 or SH_2 removed, the same bushel wohld be equal to the saturation of the impurities in 7090 cubic feet of gas. Of course these figures are theoretical, and can be approached, in practice, only to a degree; the impurities, in the form of various metallic and earthy oxides part of the lime being carbonate before insertion, part coming out as caustic lime—this alone amounting to 18·023 per cent. of the whole mass, as shown in a pamphlet on the "Use of Gas Lime in Agriculture," by Dr. Augustus Voleker,—reduce the capacity of the lime much. But if a portion of the SH_2 or CO_2 could be removed before the entrance of the gas into the purifiers (Mr. Patterson, late Metropolitan Gas Referee, propo, ses to remove all, or as much possible, of the CO_2 before the gas enters the purifiers, so as to convert the lime into CaS and by it remove the CS_2), the lime would last so much the longer. This we were doing to a limited extent before the accident, by means of our gas-liquor, which absorbs rapidly CO_2 and SH_2, making the carbonate and hydrosulphate of ammonia. We were washing our gas with a liquor of an average strength of 3½° Twaddel, in amount equal to 15 gallons per ton of coal carbonized. Experiments made by Mr. Geo. Anderson reported to British Association of Gas Managers (*J. G. L.*, vol. xxiii, p. 17) show that a gallon of gas liquor from the

hydraulic main—of 2½oz.—contains			400 cu. ins. of foul gas.
scrubber	" 6 "	"	1078 " "
washer	"14½ "	"	5000 " " "

Now, if we take our liquor, an absorption of foul gas is obtained (calling our liquor 6oz., it being about 7 oz.) 15 x 1078=16,170 cubic inches of foul gas absorbed per ton, and, if the absorption is in proportion to the volumes of the impure gases present, we get the following amount absorbed:

Ammonia.....	16,170x4·6 p. c.=	744
Sul. Hydrogen....	16,170x23 " =	3,719
Carb. Acid.....	16,170x72·4 " =	11,707
	To the ton—	16,170

which reduces the impurities to 1·46 cubic feet of NH_3, 7·80 cubic feet of SH_2, and 24·3 cubic feet of CO_2 in every 1000 cubic feet. This would reduce the work of the lime, so that one bushel would purify, theoretically, 7329 cubic feet, as against 7090, a gain of 3·3 per cent. To show the amount of absorption of the foul gases by the liquor where the scrubbers and washers are well-arranged, I would refer to the figures of Mr. Anderson, as above, where he gets 20 gallons of 14½ oz. strength, on the average, from the ton of coal; this gives an absorption of 100,000 cubic inches per ton of coal, and the lime works up to an average purification of 18,000 cubic feet per bushel, or one ton of lime purifies the gas from 70 tons of coal, etc.

Travers confirms these statements, and states further that the lime, after being worked with this method, and in thick layers, is completely saturated, and, by analysis, shows no caustic lime. These results would be more valuable, for comparison, if the volume of SH_2 and CO_2 in the gas from the inlet of washers and purifiers were given, as there are some coals that, theoretically, would give about the above purification. Taken from the condensers, the gas from Nettlesworth (England) coal contains but one per cent. of CO_2 and one-tenth of one per cent. of SH_2. (Schilling's *Journal fur Gasbeleuchtung*, 1869, p. 433).

It would seem, therefore, that there is a field for investigation as to the purification of our gas before it enters the lime purifiers, that may result in greater economy of purification, as well as giving us a purer gas.

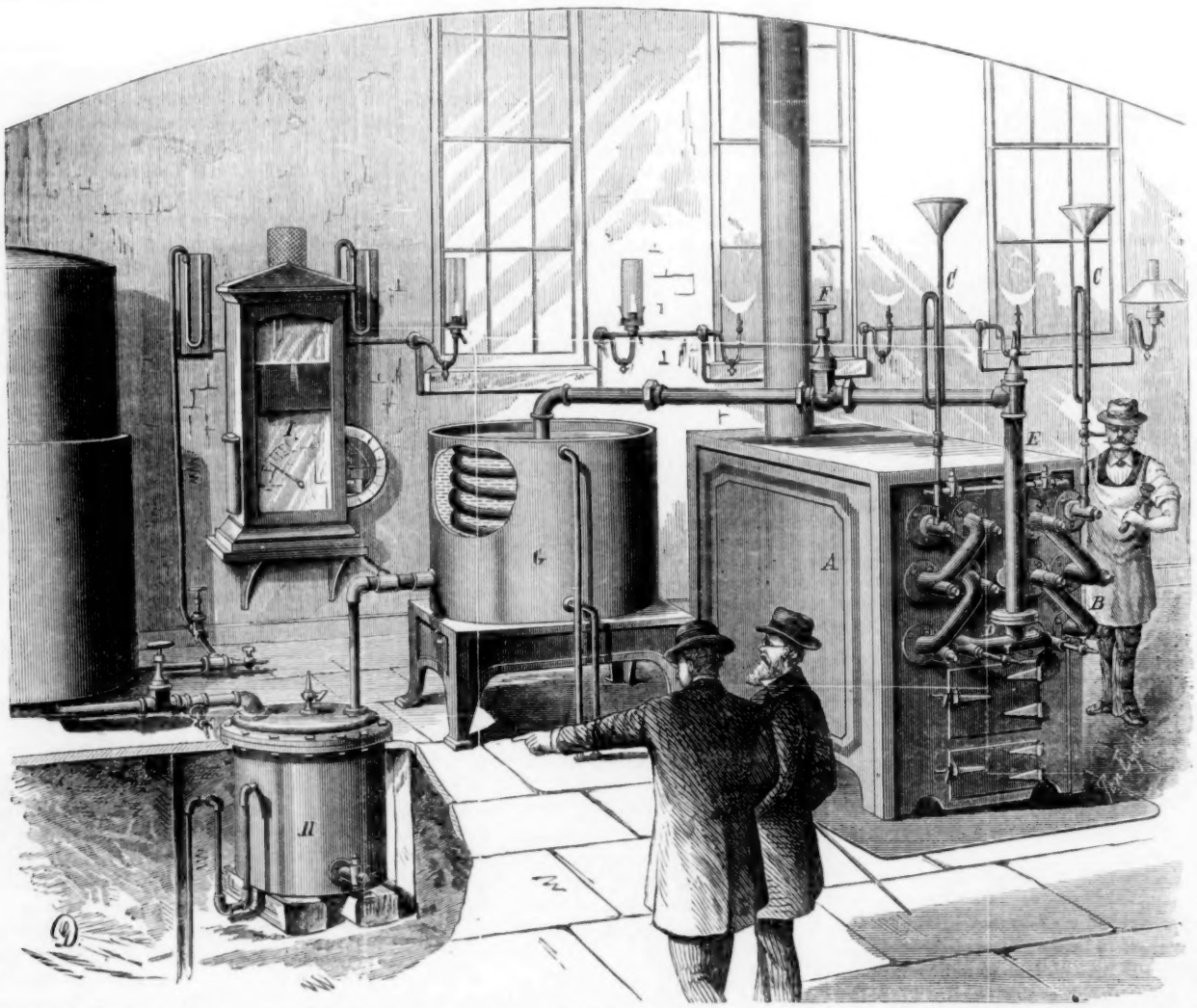
Eichholz's Patent Gas Process.

The following illlustration and description is intended to explain to our readers the character and working of Messrs. Eichholz & Greens New Portable Gas Apparatus:

"A is the generator, which consists of a furnace and oven, made of a cast-iron case and firebrick lining, in which are two series of three retorts each, contrived in a simple way, for gradnating the heat to the different substances, according to the progress of the work. The retorts are made of cast iron, and can, it is claimed, be replaced at very little expense or labor. They are free from all danger of obstruction, and they can be used alternately for oil or steam, as desired, thus preventing their oxidation; so that should the oil retorts by any chance become obstructed, the steam can be used to remove the obstacle immediately. At B are shown the outside connections of the retorts, and at C C the inlets for feeding the materials of which the gas is made.

The outside connections of the two series of the retorts are at D, and E is the stand-pipe, connected with the valve, F, which secures and shuts off the generator from the rest of the works. There is also a connection between the two upper retorts and the valves, between which is another connection leading by a T into the generator, for the purpose of blowing off (after the valve, F, is closed) the gas remaining in the retorts, after shutting down, by means of the superheated steam.

Inside the ash-pit is a water pan for extinguishing any spark or coals which may fall through the grate bars, as a precaution against danger to the building if the generator is situated is situated in one. By the pipe shown, connection is made with the cooler, G, from which there is a conduit to the drip box, H, in which any condensation is collected, and passed off directly to the sewer or drain pipe, by means of a self-acting seal. The gas from the drip-box is led to the gasometer, and in the pipe is a valve to prevent any gas escaping back to the inlet-pipe. Should any alteration or repair become necessary, this valve is closed, and the rest of the apparatus is disconnected without danger. The outlet pipe for distributing the gas, to the various pipes leading to rooms or streets, is also secured by a valve. Connected with the outlet is a branch pipe under seal, leading from the outlet to the drip box, to collect all condensation which has not before been gathered. Connected with the drip box pipe is a pressure gage which shows the pressure of the generator on the gasometer when manufacturing gas. There is also a pressure gage connected with the outlet, which shows the pressure carried by the gasometer. I is a jet photometer. Test cocks are provided to test the hydrogen and carbon separately, and also to test them when mixed, as a fixed gas before cooling."



A special committee from the Board of Supervisors of Kings County, paid a visit to Greenpoint, Tuesday January 25, to inspect the new apparatus. The working of the process was explained to this committee by Mr. J. H. Eichholz, the inventor; and, upon the conclusion of the experiment, the various members of the committee expressed great satisfaction as to the results. The following account of the experiments, as made before the committee, is taken from the Brooklyn *Daily Times:*

"The apparatus is a very simple, yet ingenious machine for the generation of crrburetted hydrogen, the carbon being produced from crude petroleum oil. The inventor claims that by his apparatus gas can be supplied for less than one-half the price charged by the gas companies, and contends that his gas is more pure and brilliant than that usually furnished.

The apparatus exhibited was capable of manufacturing one hundred feet of gas per hour, capable of supplying 20 five feet burners, and costs $1,000. Three quarts of crude oil, costing about two and a-quarter cents, were used, and a very brilliant gas was produced. Burners of various sizes, from a two foot to a six foot argand, were tested, and in every case the trial was satisfactory, the three-foot burner giving a light of far greater brilliancy than the five-foot burners at present used on the street lamps. The merits of the apparatus seemed to create a favorable impression. The apparatus can be easily manipulated by one man, needs no special skill in management and is simple and safe in construction."

This process, the inventor considers, may be adopted by large or small gas works throughout the country, with the result of producing better gas at less expense and with less labor. It requires but one man where ten men are needed in the coal gas process. The inventor also claims the process to be absolutely and perfectly safe. There is no distillation or purification necessary; and during the cold weather of 1875, the candle power was not in the least affected, and no condensation whatever found.

Mr. Eichholz says that this gas can be put in the holder, ready for consumption, in small quantities, at a price not exceeding one dollar per thousand, and, if made on a large scale, at a cost of 70 cents per thousand cubic feet.

For further particulars apply to Messrs. Eichholz & Green, 115 Freeman street, Brooklyn, E. D., New York.

To remove rust from steel, immerse the article to be cleansed (for a few minutes, until all dirt and rust is taken off), in a stroug solution of cyanide of potassium, say about ½ ounce in a wineglassful of water; take out and clean with a tooth brush, with a paste composed of cyanide of potassium, castile soap, whitening and water.

Third Annual Meeting of the American Gas-Light Association.

HELD AT MASONIC TEMPLE, NEW YORK, OCTOBER 21ST, 1875

SECOND DAY'S SESSION.

OCTOBER 21, 1875—10 O'CLOCK A. M.

[Concluded from page 31.]

Mr. Harbison—I respectfully propose, in accordance with the provisions of the Constitution, that the same be amended, as follows: By inserting in Article IV the word "Secretary," after the word "Director." So that a secretary of a gas company shall be as eligible to membership as any other officer of a gas light company.

Mr. Neal—I think the words "Secretary or Clerk" should be inserted in Article IV of the Constitution, after the word "Director." Some companies have an officer that is called a secretary or clerk. In Massachusetts the officer is called a secretary. In other places he is called a clerk, and I think that these two words should be inserted in Article IV of the Constitution, as I have suggested, after the word "Director," so that they can be eligible as members.

But referring to the point I made a while ago, I do think that the words secretary and clerk (which are the same thing) should be inserted in Article IV of our Constitution, after the word "director," so that they can be eligible for membership. We find it sometimes happens that the man who attends to the general business of the company is called a secretary or clerk. I don't mean an ordinary clerk or bookkeeper, but I mean a general business man. I move a reference of this subject, according to the rules, to the Executive Committee.

Mr. Henry White—If I am in order I should like to speak upon that motion. I think there is a line somewhere between Presidents of gas companies and their stoker, so far as their eligibility for members of this Association is concerned. I do not think, sir, there are half a dozen members who do not consider a duly elected secretary of a company as eligible to membership in this body, but if you insert this word clerk in our by-laws in that way, you would take into our ranks hundreds of fledgling gas men. We have in our works men who could properly claim to be clerks, but they are not eligible to membership here. I have in my office two young gentlemen who are preparing to be, and doubtless will be in time; gas engineers, and they rank as clerks. There are about our works and offices a number of respectable young men who would rank as clerks, but I do not think they should be admitted to membership here. The insertion of this word in our by-laws would open the doors to a large number, who would be only too glad to enter.

Mr. Neal—I did'nt mean an ordinary clerk. I meant the clerk of a gas company, or secretary, as they call him in some places.

Mr. Henry White—I think the word "secretary" will cover the ground.

Mr. C. White—I make the point of order that this is not the proper time to discuss this question. That time is when the committee make their report. The motion now is to refer the subject to the Executive Committee, and I do not think that it is a debatable question.

Mr. Henry White—I appeal to the President. If he decides I am not in order, why of course I will have nothing more to say.

The President—I shall decide that you are not in order, and will put the motion. Carried.

Mr. Price—I move, Mr. President, that the thanks of the Association be tendered to Mr. Littlehales for his very interesting paper on the use of "Wooden Pipes for Gas Mains," and to Mr. Patton for his instructive paper "On the use of Petroleum and its Products in the Manufacture of Illuminating Gas." Carried.

The President—I understand that there are other questions which it is desired shall be discussed, and one of them is the purification of gas by lime. Then there are some of the members who would like to hear from Mr. Rowland, in reference to his process of charging retorts, and there are other things we shall want to discuss. If you are willing, I think we will take up the lime process now.

Mr. Neal—I move that we do so. Carried,

The Secretary—I think Mr. Turner from South Carolina has prepared a paper on that subject.

The President—It seems that Mr. Turner is not in the room.

Mr. Crenshaw—I understand there is another gentleman here who has made some experiments in that direction. We might listen to him in the absence of Mr. Turner.

The President—We would be glad to hear him.

Mr. Gerdenier then read the following figures on the "Purification of Gas."

MR. FORSTALL'S METHOD OF LIME PURIFICATION.

BY BRIDGEPORT, CONNECTICUT, GAS-LIGHT COMPANY.

1875. Date.	Index of Station Meter.	Feet of Gas Purified.	Bushel of Lime Used.	Feet of Gas, Slacked Lime Per Bushel.	Galls. Water Used to Prepare Lime.	Pressure in Purifier. Inlet.	Pressure in Purifier. Outlet.	Days in Operation.	No. of Purifier.	Feet per Bushel Unslacked Lime.
June 3rd	1,120,000	866,000	125	6,928	210	2 9-10	2 6-10	20	1	13,856
June 23rd	1,986,000	940,000	125	7,520	250	2 8-10	2 7-10	22	2	15,040
July 15th	2,926,000	829,000	125	6,632	220	2 8-10	2 8-10	22	3	13,264
August 6th	3,755,000	525,000	125	4,200	100	2 7-10	2 6 10	13	4	8,400
August 19th	4,280,000	795,000	125	6,360	200	2 8-10	2 8-10	20	1	12,720
September 8th	5,075,000	645,000	125	5,160	180	2 8-10	2 8-10	12	2	10,320
September 20th	5,720,000	900,000	125	7,200	230	2 8-10	2 8-10	15	3	14,400
October 5th	6,620,000	600,000	125	4,800	50	2 8-10	2 8-10	9	4	9,600
October 14th	7,220,000		125		240	2 8-10	2 8-10		1	

CHARLES A. GERDENIER, SUPT.

Mr. Gerdenier—I will state, Mr. President; that these results do not come up to those of Mr. Forstall'. It is not a thing to be learned and accomplished at once. It wants to be studied thoroughly. I hope before the next meeting of the Association, to come very near the results Mr. Forstall obtained. Our works are small, and the superintendents of small works have a great deal to do and very little time or opportunity for making experiments. There are times when I cannot attend as I would like to do, to the preparation of the lime. On one occasion as we were preparing the lime I was called away; I had the men from the purifying house at work getting the lime ready, when our purifier showed that it was foul, and as, of course, I make a practice of changing my purifiers instantly we had to drop everything and go to work at that, and so I was not able to prepare my lime as Mr. Forstall did his; I think that he accomplished a great deal. It will save our company just, on lime used, $320.55 a year. That is not much to be sure, but I hope to accomplish better results.

Mr, Neal—Mr. Turner does not seem to be present. He showed me last night a cube of lime taken from his purifiers, that he brought on with him. He also showed a small portion of granulated lime that he said was a failure. I am sorry that he is not here to exhibit it.

The Secretary—Immediately after the Washington meeting I directed the man at my works to prepare the lime after Mr. Forstall's process. The first time he did it he met with excellent success, and came near Mr. Forstall's results. After that he had failures, more or less for over a month, but by perseverance, in the month of September we purified 7,000 feet to the bushel during the entire month, while before that we only averaged 4,300. I have a letter from the superintendent of the company this morning, in which he states, that up to yesterday, they had purified 7,550 feet to the bushel for the 20 days, with hydrate of lime, and tried a little slacked lime. The lime used was oyster shell lime, and the gas was made from Penn coal.

Mr. Crenshaw—As Mr. Turner is not here I will state one fact which he mentioned to me in connection with his experiments. He stated that a portion of the lime they used had become, to some extent slacked, and when they put this lime under Mr. Forstall's process, the gas was passed through it without being purified. Secondly, his experience was that the lime should be freshly slacked, in order to obtain successful results.

A member—I use slacked lime, but I buy it slacked, and have always got good results from it. I have done this for many years.

A member—He said he had a quantity on hand which was air slacked. Mr. Crenshaw did not mention the fact that it was air slacked lime. That was where the trouble come in. When I came back from Washington I used this method. I took a screen as was suggested, with inch meshes, and wet the lime thoroughly and passed it through this screen. It comes out granulated, so that it lays up very light. I had five layers of trays, and I then put on the lime in two layers, six inches on each layer. I have been running in that way since last July, and the result has been, that before I used to change twice a week, and now I only change once a week. It takes ninety bushels of slacked lime to fill one of my purifiers. I have passed as much as 800,000 through one purifier before I was obliged to change. I had one of my purifiers come off, and I saw that a portion of the lime had not been used at all. I do not understand it, but I suppose it was because of some air-slacked lime that had been used. You will see by an examination of this granulated lime, that it is filled up with impurities. I have reached as high as 9000 feet to the bushel with this slacked lime.

A member—How much on an average did you purity to the bushel?

A member—I had averaged the year before 5,000 feet and a fraction. I used the lime in that way, pressing it in the hands so that it would stick together. The way I use it is, I think, the correct way.

Mr. Crenshaw—I accept the correction that the gentleman made as to my remarks. I intended to say that the lime used by Mr. Turner was air-slacked. I did not mean that it was slacked by water.

Mr. Littlehales—There is one point I would like to mention. I have found in several instances, that when the gas had passed through the last purifier and was turned on, that it was very foul, and on examination I found that even after the gas had passed the last purifier there was sulphur, although the purifier had just been changed, and I found that it required a little extra care in cleaning the inside of the lid and the side of the receivers when changing them, as they had been so foul in the last purifier, that it had a tendency to foul the gas again.

Mr. Gerdenier—I would state that I found the same difficulty myself, but I make a practice in my purifying house, of cleaning the purifier with a stream of water, at a water pressure of thirty pounds, and give it a thorough washing, and make it so clean that you could lie down in it, almost, without soiling your clothes. In that way I get all the impurities out.

Mr. Edgerton—I will give some results from my own experience. In 1873 the result of purification was 45,000 to the barrel during the whole year. The highest purified was in October, when it reached 56,000 to the barrel of unslacked lime. Divide that by the number of bushels in a barrel and you have the result in bushels. The highest amount of sulphur found was 90 grains and the least 4 grains. That corresponds very well with the best results obtained in England.

In regard to the preparation of the lime, the time of slacking before use, depends upon the strength of the lime. Very strong lime must be slacked several days before use. Then it must be piled up in heaps, and must be thoroughly saturated with water in slacking, so much so as to make a perfect mush out of it. The water in the course of time will be absorbed. If you rake the heap over and press it through a screen, you get it in the granulated form. If you work that with your hands you can squeeze the water out of it. As before explained, the impurities are carried from the outside of the lumps to the centre, and if you break one of them, you will find that it is saturated with impurities. The impurities are taken up by the moist hydrate to the centre of the lump. Shell lime does not require to be saturated so long before use. The lime is not quite so strong as stone lime, and it is generally necessary to slack it two or three days to get the best results; but it must be slacked so that it is sloppy, and after that thrown up in a heap. It is not necessary to screen the lime. If you rake the heap over, you will find that it is pretty well broken up.

Mr. Gardenier—In slacking my lime I wet it, as Mr. Edgerton says, very thoroughly, and then after two or three days I wet it again. I had supposed that it was necessary to screen it, which I did. Afterwards, at the second time of the wetting, I knocked it to pieces with the shovel, which seemed to answer the purpose. The highest production I am obtaining now is 11,500 feet to the bushel of lime. I have a box made which contains the requisite number of cubic inches to make a bushel, so that it is accurately measured. I do not have any more pressure now than I had before I began to use the lime in this way. Before, with the same coal, I was averaging about 6000 or 7000 feet. Now my average has been about 9000 feet to the bushel of hydrate of lime. I find that I am making considerable gain in the use of the lime prepared in this way. When it is taken out of the purifier every part of it is impregnated with impurities.

Mr. Wood—I have been experimenting on Forstall's plan for purifying gas. My calculations were based on 80 pounds of stone lime to the bushel. My boxes are 20 feet square. I used to run about 2½ inches of lime on each tray. I was then purifying about 10,000 feet per bushel of stone lime, before being slacked. My first attempt on Mr. Forstall's process was very unsatisfactory. The first thing I did was to dispense with layers of trays and increase the thickness of the lime. I used three layers, 2½, 8½ and 9 inches thick. On the first attempt I think I had wet the lime too much and it was very unsatisfactory. I had no more pressure on the inlet than I had on the outlet, therefore I came to the conclusion that my lime was too moist; and on breaking it up I found it was not impregnated to the centre. I then tried it a little dryer, with a little better result. My last experiment with it was 19,500. I then had more pressure on my inlet than on my outlet.

My next trouble was, that on lifting my lids at about 3 o'clock in the afternoon to take a part of it out, I found the trays on fire. The lime had heated to such an extent that it had set fire to the trays. The workmen were also considerably annoyed by it getting into their eyes. I found that it contained 8 per cent. of sulphur, while under the former process it contained 12 per cent. That explains my experience in using Forstall's process of purification by lime.

There has been something said about air-slacked lime. I had an opportunity of trying air-slacked lime. I put 330 bushels of it in one box, and I could find no difference in its qualities for taking up the sulphur. I found that it took up about the same amount as the water-slacked lime. I think I will be able to get better results than those I have spoken of, although I do not expect to arrive at the best results, as I use nothing more than nut coal, which has more sulphur in it than lump coal.

Mr. Olney—What grade of coal were you using at the time when your trays took fire?

Mr. Wood—I was using nut coal. The coal is known with us as first and second coal. We have a little steam boat that goes to the different mines and gets a quantity of this nut coal first from one mine and then from another, wherever we can buy it.

Mr. Olney—Could you name the coal or the mines?

Mr. Wood—We know it as first and second coal. It is not Youghiogheny coal; it all comes off of the Monongahela River; it contains more sulphur than the Youghiogheny coal, and is a different coal entirely.

Mr. Olney—Is it Virginia coal?

Mr. Wood—No, sir, it is Pittsburg coal.

Mr. Dwight—I have had a like experience in trying this lime process, and have had about the same result. I think there is a great deal owing to the manipulation of the lime and in putting it into the purifiers; it has to be put in with the greatest care. If put in too compactly in one part of the purifier, the gas will not pass through it. The water will not be taken up by absorption, as is claimed by the Professor, but it will pass through parts of the box, and you will find a strata of lime that has not taken up any impurities of the gas at all in the centre. We put it in about eight inches thick. It will be taken up from the top and bottom, but there will be a strata which has not apparently taken up any of the impurities. It has to be manipulated with the greatest care. I am trying an experiment at present with very fair results. I have not progressed far enough to give any figures. We are mixing the lime with about one third breeze; I think it will purify more gas than if used as Mr. Forstall sets forth.

There is one point I would like to mention, and it is this: About two years ago we changed our purifiers and enlarged them; they had become too small for our service, and we found after the change that we ran nearly double the quantity of gas through the same lime that we had been able to do before; I think a good deal depends upon the size of your purifiers. The greater the distance the gas has to pass through the purifiers, the more it comes in contact with the lime, and the more the impurities will be absorbed by it.

I have been in the practice of wetting the lime as is spoken of by Mr. Forstall for four or five years. The quantity of water I use is seven barrels of 30 gallons to the barrel to 60 barrels of lime, which is about 200 gallons of water. I have tried as high as 11 barrels, but by careful experiment I think that seven barrels is about as much as should be put in. We use the shell lime, and put in six bushels to the charge, and we average a little over 9000 feet to the bushel. We are using Penn coal and its equivalent, Mount Washington coal.

On motion of Mr. Neal the Association then adjourned until 3 P. M.

AFTERNOON SESSION.

October 21, 1875—3 P. M.

The Association met pursuant to adjournment, and was called to order by the President.

The President—Gentlemen: If you close up your business this afternoon, you will have to do it at an early hour, as this room has to be got in readiness for the masons to meet in the evening, and we ought to close certainly by 6 o'clock. I would suggest that whoever has any matter to present, will do so as briefly as possible, and then if any one has any questions to ask, or wishes to make a reply to the arguments advanced, they can do so in ten or fifteen minutes, and that I think will exhaust the subject. If you proceed in this way, I think we shall be able to get through this afternoon. Mr. Rowland is here, and I have been requested by some members of the Association to ask that he explain his method of charging retorts.

Mr. Rowland—I can say but little upon the subject of stoking that will be of interest to you. Numerous machines have been produced in Europe and in this country, but none of them have proved successful except two, and those are the inventions of Mr. Foulis of Glasgow, and Mr. William Mann of London. At the present time this machine promises very good results. Whether it can be adopted in gas works in this country is questionable.

I have given the subject some study and some little time. I have produced models of two or three different apparatus, all tending to reduce the labor of charging in gas works, but the mere matter of putting coal in a retort is of very small consequence one way or another, compared with other matters of so much more importance connected with the manufacture of gas. The coal must be brought into the retort house in such a manner as to be put in the machine without labor. None of the machines that I am familiar with contemplates this part of the operation. The coal must be brought in in the ordinary way, in a horse cart and dumped on the floor, and then shovelled into the machine, requiring a great deal of labor. I exhibited my models in London for 30 or 40 days, and had nearly all the gas engineers of Great Britain to see them. But that does'nt amount to anything. A model will sometimes work when large machines will not. My idea was to draw three retorts at a time, and that pleased the English people very much. It has been proved, however, by actual experiment, that only one retort can be charged at a time or drawn at a time. So on my return home I turned my attention in that direction, and my arrangements are such now that coal can be taken from the coal house and deposited in the machine, or put into the scoop in charges that will not vary one per cent. either way. A thousand charges may be run through, and they may be weighed upon scales, which I have done, and they will not vary one per cent. either way. I can put the coal in the retorts and draw it out again, and can do it at a cost which, in works of the size of those in New York, would save, in the item of stoking, $150,000. I am not prepared to back my statement up by actual proof, save in the one particular of drawing red hot coke, but I think I can demonstrate that what I say is true, to any gentleman who will step across the river and see my machine work. It will probably be set up in the works of the New York City Gas Co. this winter.

I will close my remarks by requesting any gentleman to call at my office. I don't ask you as a society, for I don't want my machine to be advertised any more. It has been advertised enough already; it is a matter of very little interest to but very few in this country, as I am pretty well satisfied that no works which produce less than 1,200,000 feet a day can afford to have any mechanical arrangement of this kind in their establishment.

Mr. Neal—Why?

Mr. Rowland—Because the cost of the machine is so great, and also the cost of running it.

Mr. Neal—How many fires or benches would one of these machines keep up?

Mr. Rowland—In the New York works they have 600 retorts, and it will take three machines to run them; but you have got to have two machines do a smaller amount of work. It requires one machine to every 200 retorts.

Mr. Neal—What would be the cost of a machine?

Mr. Rowland—The cost of a machine *per se*, or with the royalty attached?

Mr. Neal—The cost of the whole thing-

Mr. Rowland—It will cost about $5000.

Mr. Neal—Including the interest on the cost, what would be the saving?

Mr. Rowland—There are a good many things to be considered—the location of the coal house, the means of getting the coal from the coal house into the retort room. If it has to be carried in a horse cart and put on the floor, and then shoveled up eight or ten feet it had better be put into the retort with that labor.

Mr. Olney—How long does it take to charge a bench of five?

Mr. Rowland—To charge any retorts, no matter how large they are, it would take five minutes.

Mr Olney—What do you estimate the difference that it would save in the loss of gas over the ordinary mode of putting it in with a scoop?

Mr. Rowland—I have no means of making any such estimate. I have no means at my command to determine that.

Mr. Olney—Under the old process of charging with a scoop it takes very nearly five minutes.

Mr. Rowland—I have seen two benches of six charged in twelve minutes by hand.

There must have been a very large force of men.

Mr. Rowland—Col. Armington was present, and he can tell how many men there were.

Mr. Olney—I merely mention this subject, which have thought a great deal about, the loss of gas in charging the retorts. Under the old-fashioned method the loss is enormous. I made an estimate for the old Brooklyn Gas Co., and I made it very low, and it was nearly equal to a dividend for the company.

Mr. Neal—If there was a large amount of carbon on the rear end of the retort, would your machine do the same work perfectly?

Mr. Rowland—It would not put any coal in that portion. It would carry its charge as far back as the carbon would permit it to go.

The President—The Executive Committee presents the name of C. F. Maurice of Sing Sing, a director in a gas company there, as an applicant for membership in the Association. What is your pleasure in regard to it?

Mr. Neal—I move that the same course be taken as was adopted in regard to other applications. Carried.

The secretary then cast a ballot in behalf of the Association for Mr. Maurice, and he was declared duly elected.

Mr. Neal—Mr. Edgerton has a little apparatus for the analysis of gas, which he would like to exhibit to the Association,

The President—We would be very glad to see it.

Mr. Edgerton then brought forward and exhibited an instrument for the correct analysis of gas, also an improved photometer.

On motion, the subject of naphthaline was then taken up.

Mr. Neal—In the works that I have under my charge, I have been troubled very much lately with naphthaline in the mains and service pipes. It comes and goes. Some days we are greatly troubled with it, and then it seems to disappear, and I have thought that, in the case of naphthaline, like produces unlike effects. The subject was discussed at a meeting of the New England Association, but not very thoroughly. The topic was "Naphthaline—its cause and remedy." I do not think either the cause or the remedy was discovered.

I am sometimes troubled very much by its forming both in the inlet and in the outlet, so that in the evening at the valve house, when the gas is being lighted, it will gradually begin to close, and after turning on all that can be turned on, there would yet be a short supply in the city. The trouble extends into the service pipes. Two or three mains have been stopped; and I was obliged to take up a 2-inch main running a short distance from the main service, and which supplied the State Prison—a large and flourishing boarding house. Each convict is allowed a light in his cell quite small, but yet they appreciate their lights very much, and when any of them have not behaved properly, their light is taken away from them, and that is about as severe a punishment as can be administered. A great many of them spend their evenings reading and writing and making toys, and thus the light allowed them is a great privilege. But that has nothing to do with the question. As I said, it was necessary to remove the two-inch pipe and put in a three-inch pipe, and it was found to be full of naphthaline and some portions of the pipe had been eaten away. I can give no reason for this.

The same trouble occurred with the pipes that supplied a railroad company. We had to take out a two-inch pipe and put in a three inch pipe. The street lamps are also choked up with naphthaline very often. I have no cause to assign for the trouble, and no remedy to suggest. I have brought forward this topic in order to get some information upon it, and at the request of a number of friends.

Mr. Henry White—Was the pipe all foul, or only in places?

Mr. Neal—In places.

Mr. White—Did you notice the depth of earth?

Mr. Neal—The depth of earth makes no difference. I suppose they were two or three feet below the surface. It is only in the summer or in the fall that it gives us trouble. It passes off entirely in cold weather.

Mr. Herzog—I was formerly greatly troubled with naphthaline, but I think I have pretty nearly, if not entirely overcome the evil, and by a simple remedy. The means I have employed is to mix with the lime a sufficient quantity of benzine, which not only tends to liquify the naphthaline, but also to relieve the pressure. I find I never have more pressure than the actual holder pressure. My object is to bring the gas into thorough contact with some of the lighter hydro carbons. I say it must be brought into *thorough* contact. Different methods have been employed. For instance, it has been poured into the gas holders in syphons, and then it has been sprinkled. But none of these remedies are anything more than partial ones. I made many experiments. I tried putting some benzine on the condensers and scrubbers; that helped partially, but it was of no great avail. Then I tried sprinkling the purifiers, and that partly diminished the trouble. I thought if I employed more I would have better results, and I did so. I find in my experience, that mixing one gallon of benzine with five bushels of lime, does away with the naphthaline pretty entirely. It is only a question to employ enough. At certain times you are not troubled at all, and perhaps you don't need any; but if you find that there are signs of a great deal of naphtha, you will have to employ more benzine. That is my remedy, and I will guarantee that if any gentleman will try it, he will find it to be as effectual as I have done. To those using iron purifiers I would recommend having a box filled with sawdust, and saturated with a hydro-carbon. If you pass the gas through that it will remove all the naphthaline, and it remains in a more liquid state in the purifiers. If you try to obtain from coal too large a yield, the naphthaline—all the circumstances being favorable—will become solid, when it does not destroy the gas it impoverishes the quality. Some gentleman here have their boxes running for a month or so, These hydro-carbons would be taken out before that time. I found, for instance, when my boxes ran too long, I had to take the covers off and give them a fresh sprinkling, and that helped entirely.

Mr. Neal—I am glad the gentleman has found a remedy, if he thinks it is a remedy. I tried sprinkling the layers and the pressure went to six inches and rose rapidly, but in a little while it was all done; it seemed to have only a temporary effect. I do not exactly understand his method, whether it is by sprinkling or not.

Mr. Herzog—I said that sprinkling did not answer very well. You want to mix the water with the lime and the benzine with the lime, and bring the gas in thorough contact with it. If gives a partial relief if you sprinkle, but if you bring it into thorough contact you will have a more thorough effect.

Mr. Neal—Where do you mix it with the lime.

Mr. Herzog—Before you put it in the box.

Mr. Floyd—In regard to to the question of naphaline, I would say that the engineer of the New Haven works is here, and he can give you some facts in regard to naphaline at those works. They were troubled with it for a good many years, so much so, that the pipes, in a great measure, were stopped up, and the complaints from consumers that they could not get gas, amounted to 150 every week. They tried a dry condenser, somewhat upon the principle spoken of by Prof. Chandler last evening, and in thirty-six days after it was put in, to the present time, all complaints about naphthaline have ceased. I have spoken in general about this matter, Mr. Sherman is here and can give you the facts in detail. I was informed that they found the dry scrubber a complete remedy for the naphthaline.

Mr. Sherman—If Mr. Harris were present he could give you more information on the subject than I am able to do. This friction scrubber was started on the 20th of October of last year, and the complaint book shows an immediate falling off in complaints from this cause. At the present time we have very little complaint from naphthaline; occasionally we have stopped service pipes. The pipes which I have opened at the works, I have found from one-third to one-half closed with naphthaline. Mr. Cox, my predecessor, says the effect of the friction scrubber is to leave the naphthaline around the works.

Mr. Herzog—I sometime ago made some observations, and found that after the hydraulic main had been in action for a few years, the pressure became somewhat heavy. On examination I found quite a deposit of naphthaline, which is conclusive proof that the liquid is capable of taking up a part, at least of this naphthaline. I will repeat what I said before, that for those using iron purification I do not think it would be advisable to mix the lime and the benzine with the iron, but to have another box and seal it, and let the gas pass through that.

Mr. Olney—I have had occasion to know the experience of five works where they manufacture gas from petroleum oil in connection with coal, and I will state that in two works where there had been a stream of complaints coming in daily, after they began the manufacture of gas from petroleum, these complaints were never heard. They were not troubled with naphthaline in any respect, and there was not a particle of it to be discovered. In any works where petroleum has been used, either alone or mixed with air or coal, I defy any one to find one particle of naphthaline.

Mr. Floyd—I would like to hear from Mr. Harris, secretary of the company I have spoken of, in regard to the use of the dry scrubber in his works, but it seems that he is not here. I have seen the official record in New Haven, and that shows that in thirty days from the time this scrubber was put in operation, there were no complaints whatever in regard to naphthaline. If this is a fact, I think all coal companies should know it.

Mr. Henry White—Mr. Cox, the engineer of these works, assured me personally that the scrubber did not work.

Mr. Price—I would like to inquire a little more definitely of Mr. Herzog in regard to his method. I would like to know what kind of oil he used.

Mr. Herzog—I used benzine at 75 Beaume. If you employ gasoline that will be far safer. If you use benzole it would not require so much.

Mr. Price—Suppose the works used iron purification, how would you use your method?

Mr. Herzog—I would construct a separate box for

that purpose, fill it with saw-dust, and saturate it with one of these hydrocarbons and pass the gas through it.

Mr. Price—How much of a box—10 by 16?

Mr- Herzog—I put five bushels in a box and a gallon of benzine.

Mr. Price—What is the specific gravity of the article you use?

Mr. Herzog—From 70 to 65 Beaume.

Mr. Gerdenier—I have used the method that Mr. Herzog speaks of for about five years. About five years ago, in the works which I have the pleasure to superintend, naphthaline had become a very serious annoyance to us, and I tried the method Mr. Herzog has spoken of. In the first place I used petroleum, and found that it took up a great deal of naphthaline. A short time afterwards I saw in Appletons Encyclopedia that naphthaline could be taken up with volatile oils, and I thought that I would try crude naphtha. I got three barrels and mixed it with saw-dust, and mixed it with my lime, and the effect was that I was totally relieved of the trouble. In the 150 bushels of lime and saw-dust together I used eight gallons of crude naphtha. I have had very little difficulty since. I have not had any in my purifiers, and have had no difficulty in the inlet or in the holder. Our works are small of course, but that was my experience.

Mr. Neal—I will bring a subject before the Association that ought to be acted on. I hope you will excuse me for making so many motions, but I am actacting as the mouthpiece of several members who ask me to make motions and present subjects to the Association. The subject I now speak of is in relation to the next semi-annual meeting. Article 17 of the Constitution reads as follows:

"The annual meeting of the Association shall be held in the city of New York on the third Wednesday of October of each year. Other general meetings of the Association may be held at such times and places as shall be directed at the previous annual meeting."

Nothing is said abaut a semi-annual meeting. Several have spoken to me about the matter, and they are opposed to having one this year. Some of the members have to come a very long distance, and they think one meeting a year is sufficient; that these proceedings are very interesting, and that if we meet oftener than that, the interest will not be kept up. Now, in order to try the sense of the Association on this question, I move that there be no semi annual meeting of the Association held this year.

Mr. Floyd—I would like to say a word or two on that subject. I have been requested by the President of the Philadelphia gas works (who, for some reason, is not here, and who asked me, in the event of his absence, to speak for him) to ask, as next year is to be the centennial year of our glorious republic, (Applause) that the next annual meeting of this Association be held in the city of Philadelphia, and to extend to its members an invitation to that effect; and he states, that so far as accommodations are concerned, we shall be properly taken care of. As I understood it, Mr. President, this could not be done without an alteration of our by-laws, and I think some action should be taken in regard to it. As our by-laws now read, every annual meeting must be held in the city of New York. It has been suggested that the Executive Committee, for instance, meet at any place designated by this Association at the semi annual meeting in May, and adjourn over the regular annual meeting to the city of Philadelphia, or adopt any other method that may be deemed proper. He expresses the hope that this Association will meet next year in the city of Philadelphia, any time after the 4th of July.

Mr. Neal—I will ask whether it is intended that he will provide accommodations for us. There ought certainly to be some arrangement of that kind made, is determined that we are to meet there. I would also inquire if they intend to pay our expenses?

Mr. Floyd—They will provide some place for you to sleep in, but you will have to pay your own expences.

Mr. Price—I do not see any necessity for a change in the by-laws in regard to this matter. We can meet here on the first day and adjourn over to Philadelphia, and hold our meeting at any place that may be designated in that city.

The President—The motion is that there shall be no semi-annual meeting held this year. Carried.

Mr. Edgerton—I think that as the Naphtha Committee failed to make a report at this meeting, and as the matter is postponed now for another year, another committee should be appointed to see if they cannot find out something about this subject. I think, as it stands now, the Association ignores the question entirely, and shows no appreciation of its importance. I believe if such a committee were appointed, with one or two members who represented the naphtha gas interest, giving, of course, the majority to the coal-gas men, they would be able to make a correct report on this important question.

The President—I have been requested to ask any gentleman who is familiar with the subject, that he will be kind enough to prepare a paper and submit it to our next annual meeting.

Mr. Edgerton—I understand that request perfectly, Papers have already been brought forward by those who represent the naphtha gas interest, and submitted to this Association. Everything that has been done has been done by naphtha gas men. We have presented facts and figures squarely, but we have not been presented with facts and figures by the coal-gas men, to disprove them. It is true we hear of a good many contradictions in privats, but no one comes forward publicly and gives reasons and facts, and places himself squarely on the record against the naphtha process. We would like to have them take some ground of opposition publicly, and sustain it by facts that they have gathered from experiment or investigation, and not content themselves by advancing mere theories.

The President—The gentlemen who composed the Naphtha Committee last year, have stated that they could not get together.

Mr- Edgerton—They didn't need to. A postage stamp in this country only costs three cents. They could have conducted their examination, if they had seen fit, by correspondence, even though they were separated. A postage stamp will carry a letter all over the country, and all they had to do was to use enough of them. In my opinion, there is no validity whatever in their arguments. I make a motion that a committee be appointed, to consist of either three or five members, giving a preponderance to the larger interest of coal-gas, for the purpose of examining into this subject. For my own part I consider the interests identical. We do not consider that we are at warfare with the coal-gas interest at all, but as the representatives of that interest are in the majority, we want them to find out the truth for themselves.

The motion was stated by the President.

A member—I move as an amendment, that it be referred to the Committee of the Whole, to report at the next annual meeting.

Mr. Edgerton—In regard to that amendment I have only to say that it is simply abandoning your position. You don't give any facts or any reasons why the positions we have taken, the figures we have shown and the results we have stated should not be examined into, and either proved to be true or false. We have stated that certain things can be accomplished. Now, let gentlemen in the coal-gas interest place themselves on the record against those statements with *facts*.

Mr. Allen—In my judgment, if the Committee of the Whole take charge of this subject, every man and every company that feels an interest in the question will investigate it. I do not believe if we were to appoint a committee of five or ten, and they were to report at our next meeting, that that report would change our action materially. All the members of the Association, before adopting the process, would certainly give it an ample examination. They would not be guided by the recommendations of any committee, but they would want to see for themselves. Therefore I think it is just as well that we should consider the subject as a Committee of the Whole. It has been pretty thoroughly discussed here, and I suppose all know now that there is an advocate for a pure oil gas, and I don't suppose we will forget that there is an advocate for a limited quantity of oil for gas, which is far superior. (Applause.)

Mr. Neal—The gentleman last but one up has seen fit to attack the committee on naphtha two or three times. He is a good friend of mine, and I have always met with the most courteous treatment from him. But he has indirectly accused the committee of negligence, and they disclaim any such charge. We have done our duty as far as possible, and we have given good reasons why we were not able to make a report, and when the gentleman says there is no validity in our arguments, I say the gentleman is very much mistaken in what he says.

The motion to refer to the Committee of the Whole was carried.

Mr. Floyd—I would like to have the question of where the next annual meeting shall take place settled. I did not exactly understand what the by laws said on the subject.

The President then read the 17th Article of the Constitution.

Mr. Floyd—How many of the members of this Association does it take to make a quorum?

The President—There is no number specified.

Mr. Floyd—Then I would like to have it understood that enough gentlemen to form a quorum meet here, and adjourn over to the city of Philadelphia. It would not do to meet here one day and adjourn to Philadelphia the next. I think it is perfectly proper that we should hold our next meeting in the city of Philadelphia.

The President—You cannot meet as an Assosiation, having decided that you will not. The meeting you speak of would have to be informal, and not as an Association.. You may meet here informally and then go to Philadelphia, if you please.

Mr. Price—It seems to be assumed that this Association is going to meet in Philadelphia during the coming year. The understanding seems to be that we are to meet here and adjourn over to Philadelphia immediately. I don't know why any such sentiment prevails. I cannot understand why gentlemen are anxious to meet in Philadelphia. It is the last place where we could think of doing business. (Applause) If we went to Philadelphia, the most of us would be out sight-seeing—looking at the Centennial exhibition. It will be no place to attend to business. If we expect to do any work as a Gas Association, we should meet here, and not in Philadelphia. I should be opposed to going to that city as an Association, and spending our time in pleasure and not in busin ss. If anybody wishes to go there to see the sights that is one thing, but it seems to me that it will be the last place to think of holding a meeting of the American Gas-Light Association.

The Secretary—Before we adjourn I would like to have instructions in regard to the preparation of papers to be read before the Association at the next meeting. I would like to know whether the Association desire to give any direction in the matter, or whether it will be left to the President and myself to select members to prepare such papers as we may deem best.

On motion, the subject was left to the discretion of the President and Secretary.

Mr. Harbison—In regard to our opening the business of the Association at its annual meeting, it appears to me that it is unnecessary to spend at least two hours, as we did yesterday, in preliminary organization. Those who have the names of new members to be admitted, should hand or send them to the secretary beforehand, so that he can hand a list prepared and read it in five minutes, and I would suggest that the secretary provide some plan by which so great a delay can be avoided.

The President—The trouble is that he don't get the information until we meet; but all the gentlemen of the Association can tell their friends to send in their names beforehand.

Mr. Harbison—In sending out notices of the meeting, the secretary might state that the names of new members must be sent in by any time the Association may choose to fix.

The Secretary—The members of the Executive Committee will bear me witness that I made every effort to save time at the opening of the meeting yesterday morning.

Mr. Neal—I move that the whole matter of making arrangements for the next annual meeting, be referred to tho Executive Committee.

Mr. Cartwright—As one of the members of the Executive Committee, I will state that we labor under a similar difficulty that the Naphtha Committee did. We are scattered over the whole country, and for that reason it would be very inconvenient if this matter were referred to us. I think that our secretary should be fully authorized to make the necessary arrangements for the meeting, as he is unquestionably the proper person to attend to such matters.

Mr. Neal—I make that amendment to my motion. Carried.

The President—I think the room down stairs is too large. I found that out yesterday, and at the request of some of the members; I asked tha officers of the building to allow us to come up here. But these rooms are used for masonic purposes every night, and for that reason they are not quite so available for our purpose as the large hall down stairs, where no meetings are held at night. Before the next meeting I will see if I can make arrangements with the trustees of the building for a room which we can occupy at our pleasure. If not, I will try and provide suitable accommodations elsewhere.

Mr. C. White—I move that the thanks of the Association be tendered Prof. Edgerton, for the exhibition and explanation of his instrument for the correct analysis of gas, and his improved jet photometer. Carried.

The President—I should like to hear something further on the subject of dry scrubbers.

Mr. Floyd—The engineer of the Harlem works, where the dry scrubber is in use is here, and also the inventor of that scrubber.

Mr. Balmore—I am not prepared to speak upon that matter at all. I will state that the machine is in use at our works, and it does very well. I invited any of the members of the Association to our works to examine it. I can explain it much better there than I can here. I suppose Mr. St. John or Mr. Rockwell can tell you more about it than I can; I am not the inventor of the machine. We are very well satisfied with its operation. If you will come up to our works I will take pleasure in showing it to you.

The President—Can't you give us results in some definite form. I would like to know something more about it. I would like to know what the effects are, and how much better it is than the old form of a scrubber.

Mr. Balmore—We have had this machine in operation for about two years. We were formerly troubled with naphthaline, but now we are almost entirely free from it.

Mr. Floyd—I desire to state to the Association that I have no interest in any manner, shape, or form, in the scrubber of which I spoke a while ago. I say this because Mr. Price, in some remarks that he made, alluded to the sale of patent rights, and to persons interested therein. I will say further that I have no interest in any manner, shape, or form, in any patent process for anything which has come before this Association. I got my information in regard to the scrubber from a gentleman connected with the works where it was in operation. Gentlemen here asked for information on the subject of a remedy for naphthaline, and the information I possessed I gave them. I think I can prove to the Association everything I have said.

Mr. Price—I can assure Mr. Floyd that nothing I said about the sale ot patent rights had the least reference to him. The gentleman gave valuable information, or it would have been if it had been sustained, but the proofs seems to be against him.

Mr. Floyd—I intended to substantiate what I said by the secretary of the company, but it seems that he is not here.

Mr. Balmore—If you will come to the Harlem works, gentlemen, and if too many do not come at once, I will do the best I can to explain the working of the scrubber to you.

Mr. Price—Have you been using anything but coal at your works?

Mr. Balmore—Yes, sir, but not at present.

Mr. Price—Have you at any time since you commenced using this scrubber, been using anything except coal in the manufacture of gas?

Mr. Balmore—We have used naphtha, but not since we have used the scrubber. Mr Rockwell, one of the owners of the scrubber is here, and he can explain it to you a good deal better than I am able to do.

At the request of the Association, Mr. Rockwell explained the construction and operation of the machine.

On motion of Mr. Neal, it was ordered that his remarks be omitted from the report of the proceedings.

Mr. Neal—I move that the secretary be authorized to have 500 copies of the proceedings of this Association printed in pamphlet form, for distribution among the members. Carried.

Mr. Neal—Mr. President: I would like to inquire if we employ any one to report the proceedings of the Association. If any one is employed here, and we avail ourselves of his report, I think we ought to contribute something, if not all, towards the expense of making it.

The President—The report of the proceedings, and of everything that has been said, is prepared and published in the Gas-Light Journal, which is printed officially.

Captain Dresser—I nave not the honor of being a member of this Association, but I wish simply to state, that the Gas-Light Journal is published for the benefit of those who are connected with, or interested in the gas business, and this Association is welcome at all times, as long as I am connected with the paper, to the use of its columns. The offer to assist us in carrying on our business by paying our reporters, I would most respectfully decline. We shall be happy to furnish to the Secretary of this Association, a verbatim report. as near as it can be made, of everything that has been said here, any we do it with the greatest pleasure.

A member—I move that the secretary be authorized to cast a ballot in behalf of this Association for Capt. Dresser, as an honorary member.

The Secretary—I think that will have to go to the Executive Committee.

Mr. Cartwright—I will state that the Executive Committee have informally contemplated naming Prof. Chandler as an honorary member of this Association, and with him, also, Capt. Dresser of the Gas Light Journal. I now nominate Prof. Chandler and Capt. Dresser as honorary members.

On motion, the secretary cast a ballot in behalf of the Association for these gentlemen, and they were declared duly elected as honorary members of the American Gas-Light Association.

Capt. Dresser being introduced to the Association, said:

Gentlemen: I expect that you will hear from me twice a month for some time to come, but just now I have nothing to say except to thank you most sincerely for the action you have just taken. (Applause)

On motion, it was resolved that when the Association adjourn, it adjourn to meet at 8 o'clock at the Hoffman House.

The Association then adjourned *sine die*.

Gas Legislation.—Assemblyman Rabe introduced a bill in the New Jersey Legislature last week, imposing a fine on gas companies for charging or collecting rent for gas meters. The bill passed the House on Wednesday, and yesterday the Jersey City and Hoboken gas companies reduced the price of gas to $2.75 a thousand, and abolished the rent on meters.

Chemical and Scientific Repertory.

A Delicate Radiometer.—At a soirée of the President of the Royal Society Dr. William Crookes exhibited an extremely sensitive radiometer, with which he was enabled to perform the novel experiment of producing mechanical motion in vacuo through the agency of the rays proceeding from a candle flame at some distance from the apparatus. The following is a brief description of this ingenious device: It consists of a glass stem supporting a four-bladed windmill carrying four discs, one at each extremity of the four slender glass rays. These work horizontally and are supported by a steel point on a small topaz. The apparatus is placed in a small glass globe exhausted of air, and the radiations from the flame of an ordinary candle placed at some sufficient distance away is sufficient to cause it to rotate with great liveliness.—*N. Y. Tribune.*

The Newly-Discovered Route to Siberia.—In 1873 a private expedition, organised by a public-spirited Scandinavian, discovered a navigable route, practicable for several months in the year, between the North Sea and the mouth of the Yenisei. Three Swedish professors who accompanied the expedition have been undergoing a series of *fetes* in the Russian capital; and attention is now strenuously directed to the new route as an important means of communication between England and the rich mineral tracts of Northern Asia. Not only, it would seem, may these almost unknown regions largely supply the raw material of our metal manufactures, but, as we learn from a memorial recently published, they are nowise contemptible as regards the production of grain; and Siberia, with its stores of metals, iron, furs, timber, and grain, may thus become an important customer to England. Largely composed of the descendants of Poles, and other political exiles, and widely separated from the administrative centres, the people of Siberia are described as possessing considerable aptitude for freedom, and not so bigotedly attached to their rulers as the inhabitants of Russia proper. At all events this new route seems to open a means of intercourse likely to be commercially profitable on both sides.—*Iron.*

New Gas Glass-Melting Furnace.—Adams & Company, glass manufacturers, Pittsburgh, will before long have their new glass-melting furnace in operation. This is a recent French invention, and it is claimed that it is much more economical than the coal furnace. The gas is generated from slack coal. Furnaces heated in the usual way require the bottom to be renewed every few months, but it is said the bottom of this style of furnace will last for an indefinite time. This will be the first furnace of the kind introduced into Pittsburgh.—*Iron Age.*

New Treatment of Naphthalin.—Some readers may be glad to learn that, according to the transactions of the German Chemical Society, C. Senhofer has prepared a new acid with the delicate name of—naphthalintelrasulphurous acid, by treating naphthalin with oil of vitriol and phosphoric anhydride; also, that L. Barth has obtained a ferrocyanide of tretramethylammonium (yellow crystals) by saturating ferrocyanic acid with tetramethylammonium-hydrate. Barth and Senhofer together have got as far as paradisulphobenzolic acid, and live in the hope of prefixing at least two more syllables as they proceed further in the series.—*N. Y. World.*

Waterproof Tissues and Paper.—Bichromate of potassa has the property of rendering glue and gelatine insoluble in water. Thus paper, and stuffs of cotton, linen, or silk, if once coated with this insoluble glue, become perfectly impervious. To render glue insoluble it is sufficient to add to the water in which it is dissolved a part of bichromate to 50 parts of gelatine. The addition is only made at the moment when the liquid is to be used. The process is conducted in full daylight. Th the umbrellas with paper prepared in this manner.—*Chem. News.*

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Correspondence

[Correspondents, in all cases, should sign their communications with their names and address in full—not for publication, unless desired, but as a guarantee of good faith.—ED.

Petroleum as an Enricher.

WEST PITTSBURGH, PA., Jan. 10, 1876.

Mr. Editor: I have read with interest the various opinions expressed by different parties for the past year on the manufacture of petroleum gas. As one interested in the manufacture of naphtha or petroleum gas, with your permission, I propose to give the readers of the Journal my experience and results in the above-named question.

It is well known, and generally acknowledged, that petroleum contains in abundance the substance requisite to produce light, viz.—carbon.

What, then, remains to be done to utilize the light giving substance it contains? I answer—to find some cheap and efficient apparatus for the manufacture of petroleum gas; apparatus that can be used by any and all coal gas companies, without the additional cost of constructing almost a new gas works in order to use petroleum—and to be of such construction that all grades of oil can be used successfully, without the additional cost of refining. Many of the inventions now in use cannot employ crude or heavy oil, from the fact that it requires too much steam to vaporize the oil. I have used the vaporizing process, and the one used in some places of dripping the oil into a retort and therein producing a fixed gas. In speaking of vaporizing I mean where it is effected by means of superheated or other steam passing through a coil placed inside of a tank or still containing the oil. I found that, in constantly evaporating and renewing the still, that the lighter portion of the oil passes away, leaving the heavy oil to settle to the bottom of the still, and after a few month's use requires a great increase of heat to vaporise it; and, finally, from the constant heat, a matter forms on the bottom of the stills resembling petroleum tar—and the result is that the tank or still has to be cleaned out, which is not a part of the play that many workmen covet.

By treating oil in the way just mentioned, considerable waste is caused, which of course tells against the use of it. In the drip process, as I call it, where the oil is introduced into a heated retort, and a fixed gas tried to be produced. I found that a considerable amount of pitchy matter was found lodging in the outlet pipes and cooler, and then submitted to the action of cold water, is clogged, the pipes and washer causing great annoyance—not to speak of the waste of material.

Another trouble I found with the process just mentioned was the tendency it had to cool down the heat of the retorts. I found it impossible to maintain the heat on a bench so used for more than five or six hours run. The facts just stated I obtained from eight years constant use of petroleum (in connection with coal), during which time I have been a close observer of the results obtained in producing gas from oil, both under my own modes of treatment and that of others, and am now firmly convinced that many of the coal gas fraternity, who are loud in their condemnation of petroleum as a substitute for coal, would alter their opinion if they were aware of the advantages to be derived from its use.

I propose to give correctly the results obtained at the West Pittsburgh gas works, and let people make their own calculations according to the price that petroleum would cost at their respective localities. I made a test of 70 barrels benzine, of 72 gravity, and produced 603,600 cubic feet of 20-candle gas. Thus producing 8,622 cubic feet per barrel. The average time to work off one barrel of oil was two hours and thirty-five minutes, using three common coal gas retorts. I will give the cost per thousand at the price paid for material here, to show how oil can compete against coal at the mouth of the coal mines.

One man, labor for 2 h. 35 min., say.....	0·60
Three bush. coke, @ 5c., fuel.....	0 15
1 bbl. benzine.....	1·75
Use of three retorts.....	0·10
Cost to produce 8,622 cu. ft.....	$2·60

or about 32 cents per thousand cubic feet.

The cost to put this apparatus into a coal gas works (which can be done in any works now in use) is about two hundred dollars. It only cost $140 to put it into the West Pittsburgh works.

In regard to waste I may add that I have not had to clean out our vaporizer since it was started 4 months ago, nor have I observed the least particle of waste of any kind. I used during the four month's run about 50 barrels crude petroleum and 25 bbls. heavy oil from the refineries, for the purpose of test, and find that I can use any kind of petroleum oil with the greatest ease. The only question that arises is quantity and price per bbl. The proportion of coal gas I use is about 50 per cent., giving about 14 candle gas, 35 per cent. oil gas, and 15 per cent. air. I am well aware that the use of air as a diluent for oil gas is condemned by most all practical gas engineers, but I have found no inconvenience from the use of the proportion just mentioned.

While most gas engineers condemn air as a mixture in oil gas, it is generally conceded that proper combustion of the gas cannot be effected without a proportionate allowance of hydrogen. Mr. Cathels, of Montreal, Canada, in his "Manual on Gas-Lighting," states in one place that hydrogen is simply the vehicle to carry the minute particles of carbon to the burner for combustion. In another place the same author ably explains how combustion of the carbon is effected by the commingling of the atmosphere. He says—

"The current of gas passing out of a burner into the still atmosphere, has a tendency to draw in upon it a portion of the surrounding air, thus obtaining a sufficient quantity of hydrogen to cause perfect combustion. (In the above quotation I am not certain as to the exact words made use of Mr. Cathels, but I think the same idea is conveyed).

Apart from the opinion of scientists on the question, I cannot see what great difference there can be in consuming oil gas mixed with the right proportion of air, or allowing it to obtain the same quantity by drawing it in from the surrounding atmosphere. My experience with the use of air mixed with petroleum gas, goes to show that the greatest trouble is in adding an over proportion of air to increase the quantity produced, thus causing the air and gas to stratify. In regard to the use of petroleum gas without any mixture of coal gas, the use of air does not work so well. I do not wish it understood that I claim any great success for air as a diluent for oil gas, but simply state that I have used it in the proportion before mentioned, without the least inconvenience. I would here remark that any statement I have made of the results obtained, I am prepared to show from the companies books, and actual test of my apparatus. Allow me to remark that to write an article for the press is not my forte. I give you the crude material, and if you deem what I have written worthy of a place in your useful paper, you can do so, and I will consider it a favor.

I am, respectfully, yours, etc.,
JOHN MCCLARTY,
Supt. and Engineer West Pittsburgh Gas Co.

A Letter from Mr. Allen.

No. 4 WARREN ST., NEW YORK, Jan. 22, 1876.

Mr. Editor: Mr. Patton, by his last communication, shows that it is utterly useless to expect anything like a decent reply from him. I have clearly proved by science and facts that his condemnation of any diluent in gas, and his repeated assertions that any non-illuminant in the composition of gas is worthless for lighting purposes, are mere assumptions, and wholly groundless; and yet, in his various replies in the *National Oil Journal*, and in the GAS-LIGHT JOURNAL, he has never dared to attempt a refutation of my arguments by any reference to the chemistry of gas, or to anything else which science approves. But in every instance his replies have been made up of mere platitudes and personalities, and his last letter is no exception.

The gas association, at its late meeting, presided over by its able and accomplished president, in his most felicitous manner was, throughout its session, in the happiest mood, and humorous remarks and retorts were by no means confined to any individual member. But suppose that some had laughed, and even made faces at the idea that water was good for for anything except "to put in whiskey," would that be any argument, or tend in the slightest degree to prove that any diluent in gas is a mere subterfuge only, or, that gas which will not give any light is not worth any money for illuminating purposes, or, that water-gas, as now made, is not what I claim it to be—the cheapest, most permanent, and best basis for a brilliant light?

When the Citizens Gas Company commenced to light Poughkeepsie, on the first of July last, there were 268 street lamps burning gas, and about 237 burning oil. Since that time more than 130 of the latter, in fifteen different sections of the city, have already, by the votes of the people and the ordinances of the Common Council, been supplied with gas by the new company; and, also, a large number of the citizens have dispensed with their oil lamps and fixtures, and now use the gas of the same company.

Mr. Patton boastingly says he is able to refer to ten gas-light companies, and no works that he has built have ever abandoned the pure oil gas. Well, there are more than ten places where the "pack mule" mode of transportation will answer, being the best that can be had there. But that would be no reason for building a railroad to do the work of a "pack mule."

Mr. Patton closes his letter by warning all established gas companies against the use of water-gas. This is very cool even for him, seeing he admitted that he had never examined the subject; and such is the value of what he presents "simply as a contribution to the general fund of information."

And now, Mr. Editor, I turn to something of more importance than Mr. Patton's opinions. You have published what I said in the Association, and I neither retract nor qualify anything that I did say. It was all true, and will bear investigation. There were a few verbal errors that crept into your report, in your Journal of the 17th inst. For instance—"You can't use pure carbon for gas, without reducing it to a very small light. Why? Simply because there is in it the heating element to prevent combustion."

It should read—"because there is in it a lack of the heating element to create perfect combustion."

Again, in 2d column, page 27—"Now, if you get a basis for gas which is incondensable, and which has a high calorific intensity, and substitute that for a non-illuminant, then you get something which has light." It should read—"and substitute that for the non-illuminant in coal gas, and add a proper amount of carbon, then you get something which has light."

Again, near the top of the 3d column—"ought they to make their customers use a larger amount of gas than comes through their burners, for the sake of having them take a few more thousands of it?"

It should read—"Ought they to make their customers use a larger amount of *poor* gas (which comes through their burners faster than *good* gas) merely for the sake of having them take more thousands of it?"

Again, in the first column, page 28, there is a mixture of what I said about "iron apparatus" and common retorts.

When I spoke of iron apparatus and iron retorts, I was referring to the early experiments made by Mr. Gwynne. That was long prior to the time I referred to when speaking of what was done in Connecticut, when I said—"at that time we had nothing but common retorts."

Again, in speaking of the company in Connecticut, "that when they had completed their arrangements, the superintendent ordered a large number of *retorts*; afterwards he thought he would have them a little better, and he ordered them an inch larger—and they had to be made an inch smaller, and he would not use them."

I said superheaters, not retorts, and that they had been made an inch smaller, and he would not use them."

When it is considered that the superheaters are made of clay, 6½ by 9½ inches, and five feet in length, it will readily be seen that an inch smaller instead of an inch larger, would make a great difference in their strength; whereas, an inch, more or less, in a retort, would be of slight importance.

Again, there is an error in making me say that I desired to answer the question put by Mr. Harbison as to why the use of petroleum had been discontinued at the Harlem works. I said nothing about the *Harlem* works; but I spoke of works at *Newark*.

"Mr. Olney—Were these retorts used?"

This question shoul read.—"*Are* these retorts and your process used there now?"—to which my answer as reported is appropriate."

While on the subject of the hydrocarbon process, allow me to say that your careful synopsis of Dr. Hofman's article on "Hydrogen as a Source of Heat and Light," as compiled from the *Chemical News* of London, and published in your Journal of 2d of January, shows two things very evidently—

1. That in all the various and complicated inventions and efforts made in Europe to produce water-gas, so extensively examined and described by Dr. Hofman, not one of them bears any near resemblance to our process; and this corroborates our well-founded claim that ours is in fact wholly an American invention.

2. That experiments were "made with water-gas at the town of Elizabeth, in New Jersey, which then yielded unsatisfactory results as made known in 1865." This was 10 years ago, and those "unsatisfactory results" arose from the use there, by Mr. Gwynne, of iron apparatus," but since that time, our engineer, Mr. Geo. W. Harris, has, by various improvements, overcame all difficulties; and we have been able to obtain a complete success in making water-gas, which being enriched to about 17 candles, gives extraordinary satisfaction.

The Citizens gas company now have the means of measuring exactly the quantity of oil that goes into the retorts daily, and find that it runs from 3½ to 4 gallons per 1,000 feet of gas.

When the gas there reached the specific gravity of ·640 (erroneously stated as ·740, but corrected in your last issue) it contained about five per cent. of wood gas, and when tested with about ten per cent. of wood gas in the holder, the specific gravity was increased to ·703.

But any one using this process can, without any change of apparatus, add wood gas or not in a greater or smaller quantity as they may prefer. We have found, however, by careful experiment, that water-gas is far better than wood gas as a diluent for rich oil or coal gas, and the reason for this is very apparent. Hardwood is composed of carbon and oxygen with only about six per cent. of hydrogen, consequently the resultant gas is almost wholly carbonic oxide, and its specific gravity is abont ·965.

It cannot, therefore, take up and utilize the heavy oil vapors (as does hydrogen) which is the lightest substance known in Nature, and composes nearly two thirds of the elements of our water gas.

I give this simple statement of facts in place of argument.

In large or considerable works where it is desirable to make coke to run the fires, one-half of the whole consumption of gas can be made from the best caking coal without regard to the candle power, and consequently at a reduced cost—the other half, of high candle power, under our process, at fifty cents per 1000 feet—and the two united would make as light a specific gravity as ought ever in justice be delivered to consumers.

The people will not be satisfied with "thin molasses," and the reduction of a penny a gallon will not stop their complaints. Better give them a good article and they will pay the price without grumbling.

H. P. Allen.

Gas-Light Intelligence.

United States.

A political prodigy has appeared in Ohio in the person of a state gas inspector of the name of Dodd, who is so convinced of the uselessness of his office that he has requested the Legislature to abolish it.

Citizens' Gas-light Company of Newark.—The following gentlemen were recently elected directors and officers of the above-named company:—

Directors.—A. A. Smalley, Samuel Street, Henry C. Kelsey, Joseph A. Halsey, Jabez Cook, James M. Durand, C. S. Lighthipe, Samuel Stuart, John L. Blake.

Officers.—President, A. A. Smalley: treasurer, John Cook; secretary, C. L. Nelson.

At the regular weekly meeting of the Board of Aldermen in Brooklyn, January 17th, the following resolution was adopted by a vote of 22 to 1:

Resolved, That permission be and the same is hereby given to the Mutual Gas-light Company, of the City of Brooklyn, to lay pipes for conducting gas through the streets, avenues, lanes, alleys, and squares in said city, for fifty years, to be subject to the same restrictions, as to the mode of laying down said conductors, as apply to and govern the other gas-light companies in the City of Brooklyn.

This resolution was offered after the reading of the following letter;

Brooklyn, January, 15, 1876.

To the Honorable the Common Council of the City of Brooklyn:

Gentlemen:—I have the honor to inform your Honorable Body that the undersigned represents a Company, composed of citizens of Brooklyn, which has been organized under the general laws of the State of New York, passed February 16, 1848, and intended for the purpose of manufacturing illuminating gas in the City of Brooklyn; said Company is known and designated as the Gas-light Company of the City of Brooklyn, State of New York; and in pursuance thereof I respectfully make application to your Honorable Body for permission to open the streets and avenues of said city, for the purpose of laying gas mains and conduits, to enable our Company to accomplish the objects of its organization. Should your honorable body grant us this permission we will furnish gas to the City of Brooklyn of an illuminating power, equal to twenty candle light, at a reduction on their bills of at least 20 per cent. less than the present proposed reduced rates of our city gas companies. We will furnish and set the meters, lay the service pipe and connect the same with the pipes in the buildings free of all cost to the consumers. We claim that our fellow citizens should have the right and benefit of persistent and well organized competition as the only means of obtaining cheaper and better gas. We also respectfully represent that the removal of upward of 2,000 gas meters from the houses of gas consumers in this city within the four months last past, indicates a degree of necessity for cheaper and better light by the people that cannot be wisely disregarded by your honorable body, and to that end we will give such security and assurances as your honorable body may suggest as a guarantee of our good faith, as well as of our ability to maintain a company that will successfully compete with all opposition for the privilege of supplying a cheap and superior quality of gas to the people of Brooklyn.

The Mutual Gas-light Company of the City of Brooklyn, by Ward B. Meeker, President.

Another proposition was read to light the streets with kerosene oil at $20.50 per lamp per annum.

Great Britain.

Extract from Report of Mr. Henry Woodall to the Leeds Corporation Gas supply, *from Journal of Gas-lighting*, December 21st.

[In connection with the subject of "poor gas" about which there is so much cry just now, we give the following extract, hoping it may call the attention of our own companies to a source of troubles to which, as we have before intimated, many of the complaints may be justly attributed, although the consumers may use whatever burner they choose, still no opportunity should be lost to properly instruct them as to their own best interests.—Ed.]

It will be seen by the magistrates gas examiner's report that the average illuminating power of the gas supplied during the month has been equal to 17 candles. With gas of this quality, which is superior to that supplied to most of the towns in England, there ought to be a sufficiency of light, and feeling assured that the burners commonly in use were largely to blame for the dissatisfaction which has recently been expressed, I have tested a variety, with the following interesting results:—

	Per 5 Feet per Hour.
London Argand 27 holes.....	18·06 candles.
Christiania (regulated).....	15·22 ,,
Borner (wide cut batwing)....	16·41 ,,
,, fine.....	11·93 ,,
No. 3 tulip burner, very commonly used in Leeds.....	5·25 ,,

The waste of gas here shown is enormous, the difference between the best and worst results being 12 81 candles, more than 60 per cent.

The subject of burners is of such importance to the gas consumer that I shall be glad to receive from the committee permission to exhibit in the windows of our central offices a number of specimens, with the object of showing the public the importance of exercising judicious care in their selection, every quality of gas requiring to be burnt under certain conditions for the full development of its illuminating power, and thus a burner which is suited for 12 or for 20 candle gas may be, and generally is, quite unsuited for such as that uniformly supplied under your direction.

Henry Woodall, Gas Engineer.

Permit me to say that the tests I have given are of burners which happened to be in my possession at the time. There are many other descriptions equally good as several in the list, while no doubt there are many in use inferior to the worst. I purpose making experiments over an extended variety, which I shall be happy to report upon at another opportunity.

In continuation of the above we give the following from the *London Journal of Gas-lighting*, December 30th, 1875:—

THE TESTING OF GAS-BURNERS

Sir,—It is from such valuable reports as that supplied to the Gas Committee of the Leeds Corporation by Mr. H. Woodall, which appeared in your issue of the 21st inst., that the education and enlightenment of Gas Committees in particular, and the public in

general, as to the best methods of consuming gas, will be sure to come.

The enormous waste incurred by the use of certain burners is clearly shown in Mr. Woodall's table; but there seems to be an important element omitted in regard to the testing of the burners, which must always be taken into account when making comparisons—that is the pressure of the gas at the point of ignition.

With rich cannel gas, such as we have in Scotland, pressure has not such a strongly-marked influence in deteriorating the illuminating power: but when we leave gas of from 26 to 30 candle power, and come down to that of from 14 to 20, the influence of pressure on the economy of consumption is very marked indeed; sufficiently so, perhaps, to account for some of the results presented by Mr. Woodall. We see from his table that with a Bronner wide-cut batswing, burning 5 cubic feet of gas per hour, the candle power developed was 16·41, while with a Bronner fine-cut batswing the candle power was only 11·93. Here are two burners by the same maker giving very different results, and the natural question is, why? It would be interesting to know if these burners were tested under the same conditions as to pressure, and also what pressure was used in consuming the gas burned by the No. 3 tulip burner, which only gave an illuminating power of 5·25 candles.

Nothing would sooner bring about a revolution in the method of consuming gas, or teach the public how to get as nearly as practicable, the theoretical value from it, than the simple and, to the general public, intelligible method Mr. Woodall proposes. Were gas companies to display in their windows, or inside their offices, a number of specimens of good burners, consuming gas under favourable conditions, and having cards stating in large characters the rate of consumption of each particular burner, reference from the card to the size and power of the flame would soon educate the eyes of those who take an interest in the matter as to what sort of light they should have in their houses or business premises.

How often is the quality of the gas blamed, when the fault lies entirely with the burner and the pressure at which the gas leaves it. And the loss and inconvenience of bad light are not the worst of it, but the imperfectly consumed gas goes to vitiate the air, and make the unhealthy and oppressive atmosphere so well known and so characteristic of many places where gas is largely consumed, clearly showing that little attention has been given to choosing proper burners, or modifying the pressure to suit the quality of the gas.

It is to be hoped that Mr. Woodall will carry out further his valuable experiments, and give to the readers of the JOURNAL OF GAS-LIGHTING the benefit of his labors.

D. BRUCE PEEBLES.

Fountainbridge Works, Dec. 24, 1875.

American Patents.

Patents issued for week ending Dec. 28, 1875.

	Class.	Number.
Gas Generator—W m McKnight, Troy, Ohio; filed Sept. 18, 1875.	66	171,578
Gas Machine—T. B. Fogarty, N.Y. City; filed Nov. 10, 1875	27	171,607
Gas Stove—H. D. Hawley, Albany, N. Y.; filed June 11, 1875	65	171,617
Fire-place Heater—W. D. Greseman, Morgantown, W. Va., filed Nov. 24, 1875	154	171,612
Hydrant—S. Blackie, St. Lous, Mo.; filed Oct. 8, 1875	167	171,499

Patents issued for week ending Jan. 4, 1875

Burner for Gas Stoves—T. J. Kelly, (Re-issue)		6,833
Gas Burner—O. J. McGann		171,831
Carburetter—A. Wiggin		171,751
Gas Stove—W. M. Jackson		171,814

Gas Stocks.

Quotations by W. B. Scott & Co., Bankers,

24 PINE STREET, NEW YORK CITY.

FEBRUARY 2, 1876.

☞ All communications will receive particular attention.

Gas. Co.'s of N. Y. City.

	Capital.	*Par.*	*Bid.*	*Asked.*
Harlem	$1,850,000	50	130	138
Manhattan	4,000,000	50	300	303½
Metropolitan	2,500,000	100	170	161
" Scrip	..	..	104	105
Mutual	5,000,000	100	109	110
New York	4,000,000	100	150	153
Central, Westchester	466,000	50	100	105

Gas Co.'s of Brooklyn.

Brooklyn	2,000,000	25	216	220
Citizens	1,200,000	20	116	120
" Scrip		...	100	101
Peoples	1,000,000	10	80	90
" Bonds		...	96	98
" Scrip		...	95	98
Metropolitan	1,000,000	100	80	85
Nassau	1,000,000	25	110	120
Williamsburgh	1,000,000	50	147	150
" Scrip		...	100	102

Out of Town Gas Companies.

Buffalo Mutual, N. Y	750,000	100	50	50
Baltimore, Md	2,000,000	100	190	...
Brockport, N. Y	25,000	...	...	85
Citizens, Newark	500,000	...	70	75
Derby of Conn	160,000	100	...	80
East Boston, Mass		25	112	115
Hannibal, Mo	100,000	100	58	60
Hartford, Conn	700,000	25	41	43
Hempstead, L	40,000	100	...	100
Jersey City	386,000	...	160	...
Jamaica, L. I	25,000	100	...	100
Jacksonville, Ill	120,000	50	80	90
Lewistown, Maine	400,000	100	...	75
Lima, Ohio	60,000	100	10	...
Laclede, Mo			...	123
Peoples, Jersey City		...	130	140
Peoples of Albany	1,000,000	100	31	40
Peoples of Baltimore		25	108	...
Rochester, N. Y		100	50	...
Richmond Co., S. I.	300,000	...	100	105
Fort Wayne, Ind		100	...	105
Woonsocket, R. I	150,000	100	100	...
Halifax N. S	400,000	40	148	150
Hamilton, Ontario	150,000	40	112½	
Jacksonville, Ills		82		

Gas stocks sold at auction were—

$5,200 Metropolitan Gas Co.'s Scrip @ 106; 25 shares of same Company @ 160; 50 shares Brooklyn Gas Company, @ 216; 100 shares Manhattan Gas Co.'s stock, @ 303-305; 3,000 Peoples Gas Company, of Brooklyn, certificates, @ 83¼-84; 1000 Williamsburgh reg. certificates. @ 104¼.

The Peoples Gas Company, of Jersey City, has declared a dividend of 4%, paid Jan. 20th. Harlem has declared a 4% dividend, payable Feb. 7th.

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

FEBRUARY 2, 1876.

DELIVERED IN NEW YORK.

English Cannel.

Ince Hall	$17 00	@	18 00
Kirkless Hall	16 50	@	17 00

English Caking Coals.

Newcastle Gas	$5 50	@	00 00
Liverpool caking	11 50	@	12 00

British Province Coals.

Pictou			2 00
Block House—At Mines, $1.87, Gold			2 00
Caledonia—At Mines, $1.50, Gold			0 00
Little Glace Bay—At Mines, $1.75, Gold			0 00
Lingan—At Mines, $1.75, Gold			0 00
Sydney—Old Mine			3 00
" Reserve, $1.75, Gold Mine			0 00
" International			— —

Duty, 75 cents per ton, gold. Freight to New York $2 00 currency. Cost of above coals delivered in New York, $4 75 @ $5 00, currency.)

Pennsylvania Coals.

Penn Gas Coal—At Amoy	$5 60	@	0 00
Westmoreland—At Amboy	5 60	@	0 00
(In New York both the above coals $6 00)			
Shafton	6 50	@	0 00
Youghiogheny	6 00	@	0 00
Waverly	6 00	@	0 00

West Virginia Coals.

Murphy Run	$6 50	@	0 00
Despard	6 50	@	0 00
West Fairmont	6 50	@	0 00
American Gas Coal	7 40	@	0 00
Fairmont	6 50	@	0 00
Newburgh Orrel	6 50	@	0 00
Pinnickinick	6 50	@	0 00
Cloverhill of Virginia	6 00	@	6 50
McKenzie Compound Mixture			— —

American Cannel Coals.

Peytona of West Virginia	$12 50	@	00 00
Darlington of Pennsylvania			— —
Cannelton Cannel			11 00
Red Bank—at Philadelphia			6 50
" —at South Amboy			7 25

Asphalts.

Albertite of New Brunswick	$21 00	@	— 00
Trinidad Bitumen	— —	@	14 00

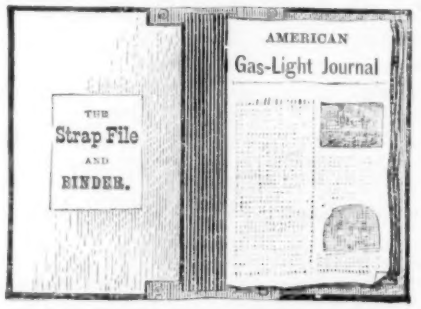
The Penn Gas Coal Company have contracted with the Pittsburgh Gas-Light Co. for their entire supply for the ensuing year from their Youghiogheny mines.

Within the last week contracts have been made by some of the companies in New York for about 200,000 tons of Penn, Westmoreland, Waverly, Youghiogheny, and the West Virginia caking coals—at $6·00 per ton, a reduction of 50 cents from last years' prices.

Keep the Journal for Reference.

HUTCHINSON'S PATENT

Strap File and Binder



ADVANTAGES OF THE STRAP FILE.

1st. It is simple, strong, and easily used.
2nd. Preserves papers without punching holes.
3rd. Will always tie flat open.
4th. Allows any paper on file to be taken off, without disturbing the others.

We will furnish to our subscribers this important article for *preserving in a convenient form*, the numbers of the Journal as it is issued, at the very low price of **$1.25**. Sent either by Express or Mail, as directed.

By Mail the postage will be **30** cents, which will be added to the price of the Binder. Send orders to

A. M. CALLENDER & CO.,
42 Pine Street, Room 18, New York.

TORRANCE, MERRIAM & CO.,

1852 TROY, N. Y., 1876.

MANUFACTURERS

OF THE GENUINE

SABBATON

Coke Shovels,

WITH EITHER

Long or D Handles.

WELL KNOWN AMONG

The Principal Gas Companies throughout the Country.

PRICES REDUCED, and Shovels delivered in New York per lots of one dozen or more.

Orders solicited. 399-6

CLAY RETORTS,
CLAY RETORTS.

JOSEPH CLIFF & SONS.

WORTLEY, LEEDS,

ENGLAND,

Are open to arrange with a respectable and responsible firm for the sale of their

Patent Clay Gas Retorts,

For the United States and Canada.

These goods are very superior to any yet made, and are specially suited for export, being so strong and well made.

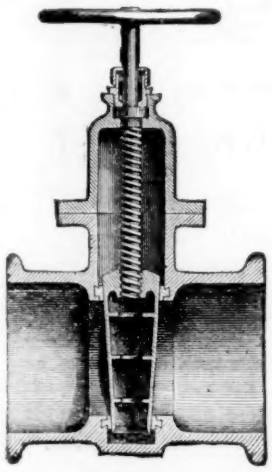
J. C. & Son would deliver at New York or other port—the firm of Agents would then take all expenses and responsibility. They can be delivered at such prices as will assure a very large trade. References given and required. 2t

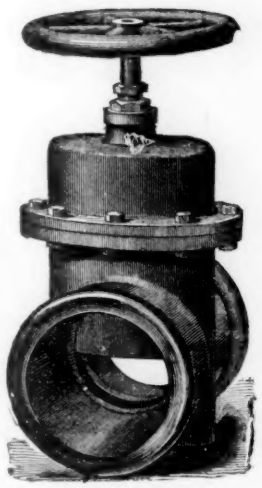
CHAPMAN VALVE MANUFACTURING CO.

MANUFACTURERS OF

CHAPMAN GAS VALVES.

Office and Sales Room 75 and 77 Kilby Street, Boston.





These Valves have been in use for several years, and are pronounced by all who have used them to be

The Best Gas Valves Ever Made.

They afford a direct passage the full size of the pipe. The seats are made of an alloy similar to BABBITT metal, specially prepared for the purpose, and superior to all other metals used for the seats of Gas Valves. It does not corrode under any circumstances to which it is exposed.

There is NO LIABILITY OF COHESION between the Gate and Seat, and the Valves can be relied upon to SHUT TIGHT and OPEN EASILY at all times—an important desideratum when used for street mains, in cases of fire.

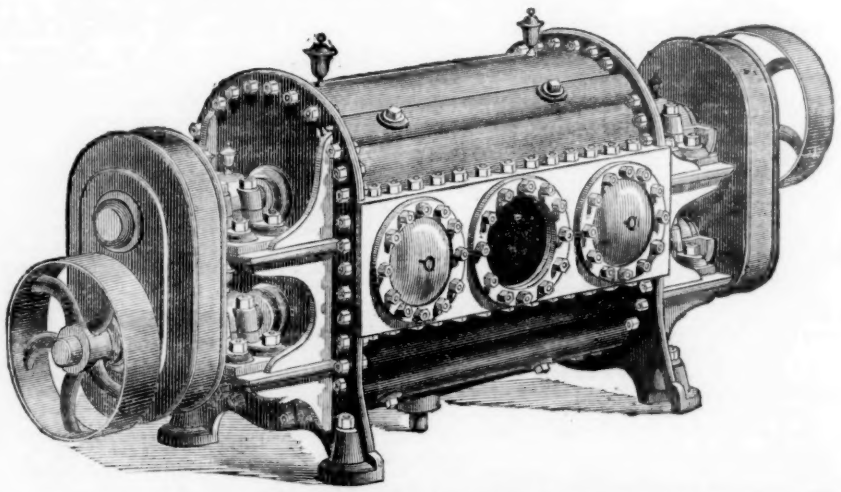
We refer to the following named Gas-Light Companies among the many that have used these Valves:

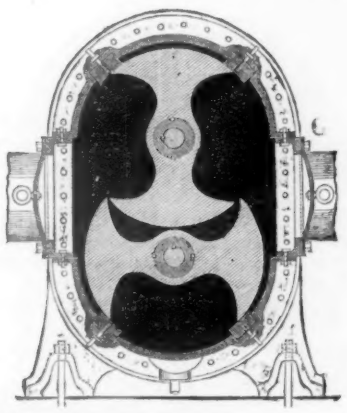
BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CAMBRIDGE GAS-LIGHT COMPANY, CAMBRIDGE, MASS.
NEWTON & WATERTOWN GAS-LIGHT CO., WATERTOWN, MASS.
LAWRENCE GAS-LIGHT COMPANY, LAWRENCE, MASS.
PEOPLES GAS-LIGHT COMPANY, BROOKLYN, N. Y.
CITIZENS GAS-LIGHT COMPANY, BROOKLYN, N. Y.
SOUTH BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CHARLESTOWN GAS-LIGHT CO., CHARLESTOWN, MASS.
LYNN GAS-LIGHT COMPANY, LYNN, MASS.
FITCHBURG GAS-LIGHT COMPANY, FITCHBURG, MASS.
CITIZENS GAS-LIGHT COMPANY, NEWARK, N. J.
WILLIAMSBURGH GAS-LIGHT CO., WIRLIAMSBURGH, N. Y

GAS AND WATER VALVES ½ INCH TO 36 INCHES DIAMETER.
STEAM VALVES ½ INCH TO 12 INCHES DIAMETER.

357-tf

PATENT IMPROVED GAS EXHAUSTER.





P. H. & F. M. ROOTS, PATENTEES AND MANUFACTURERS, CONNERSVILLE, IND.
S. S. TOWNSEND, GENERAL AGENT, 31 LIBERTY STREET, NEW YORK.

The following are some of the advantages we claim for this Exhauster over all others:

FIRST.—It is simpler in its mechanical construction than any other Exhauster in use.

SECOND.—The internal parts consist of only two revolvers, each cast entire in one piece, without a single screw, bolt, nut, washer, key or other part to get loose on the inside and stop or break the machine. The internal operating parts, therefore, can not get out order, and hence require no care or attention.

THIRD.—Every part of the machine requiring care or attention, as the journals, gearing, etc., is external, easily observed and attended to. All changes, adjustments, and repairs are made from the outside. The journal bearings, if necessary, can be renewed in a few minutes.

FOURTH.—The internal operating parts are practically gas-tight, but are not in actual contact, hence there is no internal friction or wear. The machine is therefore operated with less power than any other.

FIFTH.—They are built in the most complete and substantial manner, with steel shafts and improved journal bearings, and their durability is almost without limit.

We build them of any required capacity, large or small, adapted to any kind of works or place.

Send for Illustrated Catalogue, giving all particulars as to capacity, speed, power required, dimensions, and price of each size and references to parties using them.

P. H. & F. M. ROOTS.

GAS COALS.

THE
PENN GAS COAL COMPANY

OFFER THEIR

COAL, CAREFULLY SCREENED,

AND PREPARED FOR

GAS PURPOSES.

Their Property is located in the Youghiogheny Coal Basin, near Irwin's and Penn Station, on the Pennsylvania Railroad, and on the Youghiogheny River.

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Pennsylvania Railroad, Pier No. 2 (Lower Side).
Greenwich Wharves, Delaware River.
366-1y **Pier No. 1 (Lower Side), South Amboy, N. J.**

CANNELTON COAL CO.

OF WEST VIRGINIA.

Offer for sale the following Coals, from their Colliery at CANNELTON, Kanawha County, West Virginia, delivered at RICHMOND, Va.:

CANNELTON CANNEL,

cknowledged to be the most valuable ENRICHER produced in this country, a gross ton yielding **10,000** ubic feet of GAS of **64·54** CANDLE POWER; COKE **32** bushels, of good quality.

CANNELTON CAKING COAL.

Volatile Matter.	Coke.	Per cent. of Ash in Coal.	Per cent. of Ash in Coke.	Sulphur in Coke.	Sulphur in Oötl.	Sulphur in Volatile Matter.	Specif. Gravity. Coal.	Specif. Gravity. Gas.
35.1	64.9	2	6	.82	1.48	.66	1,289	.476

MAXIMUM YIELD, **5.06** cubic feet of Gas per pound of Coal—A yield of **4·78** cubic feet per lb.—gave **16 14-100** Candle-Power.

COKE, of very fine quality—**1453** pounds produced from one ton of coal.

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SCOTCH CANNEL COALS.

THE SUBSCRIBER IS PREPARED TO CONTRACT FOR the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES McKELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

ESTABLISHED 1840. 337-1y

WREN'S GAS WORKS.

W. C. WREN,

Corner of Jay and Water Streets,

BROOKLYN, N. Y.

HAVING GRANTED THE USE OF ONE OF my Patents to the Gas-Light Company of America, and settled my claim against them, I inform the profession that I continue to erect the Works known as

Wren's Gas Works,

and sell Licenses to use my Patents for making Gas from Petroleum.

Gentlemen of the profession:—As your consumers demand a better light, and as that demand has been in many cases sought in vain to be met by using different abortive imitations of my various processes, would it not be well to make success sure by trying the plan of the Inventor.

You can enrich your Coal Gas to any desired standard, by using my process, in the simplest manner, and much cheaper than by *any other* method. Address as above.

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It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

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Best dry coals shipped from Locust Point, wharves, and prompt attention given to orders for quartering of vessels.

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THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.

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Mines in Harrison County, West Virginia.
Wharves Locust Point, } Baltimore.
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*** Reference to them is requested. 204-1y

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Of Pittsburgh, Pa.

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GWYNNE AND HARRIS PATENTS.

This process has been fully tested nearly 50,000,000 cubic feet of Gas having been made under it, and fully demonstrating the fact that it is the greatest improvement ever made in the manufacture of Gas, either for Lighting or Heating purposes. With half a ton of Anthracite Coal 150,000 cubic feet of Gas per day is made from three benches, and the labor is so small that one man can attend three or four benches.

The process can be put into either Coal or Oil Gas Works (or where both Coal and Oil are used) at small cost, without any interruption to the working of other benches. The Citizens Gas-Light Company of Brooklyn, after using it for more than seven months, have found it not only far better, but actually *cheaper* than atmospheric air in making Gas, with the use of "petroleum and its products."

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GAS ENGINEER,

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355-

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Offer for Sale the

YOUGHIOGHENY COAL

DOUBLE SCREENED,

from their Colliery at Smith's Mills, on the Youghiogheny River, thirty-seven and a half miles southerly of Pittsburgh. This Coal has the preference in Pittsburgh over all other YOUGHIOGHENY COAL for GAS PURPOSES.

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ALWAYS ON HAND.

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And Every Description of

GAS FIXTURES,

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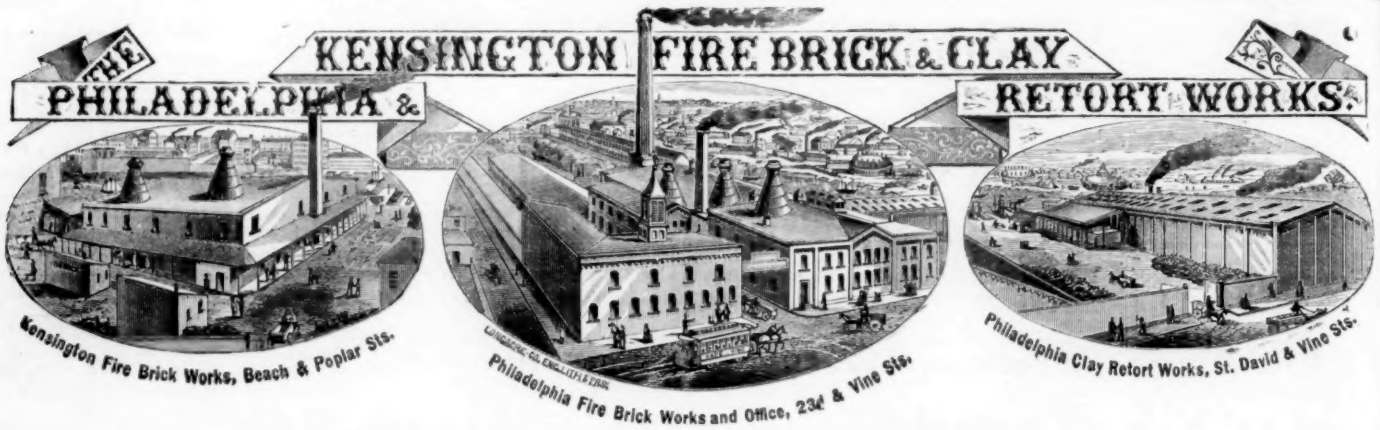
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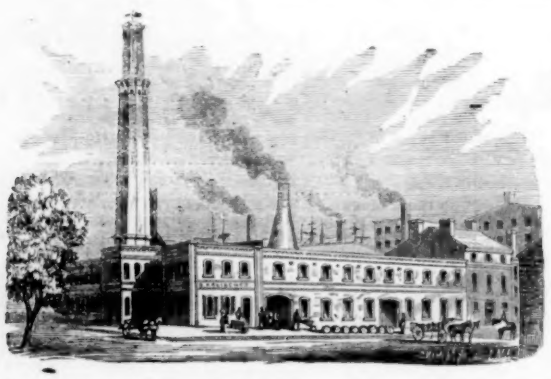

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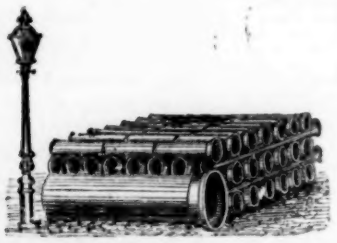

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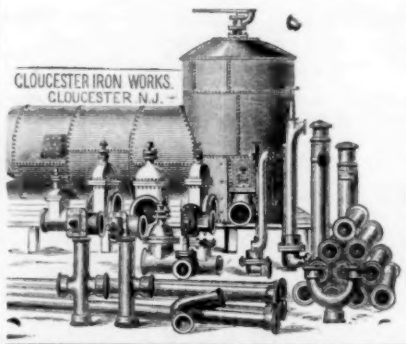

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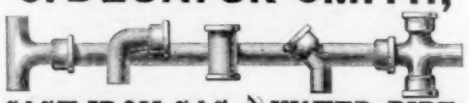

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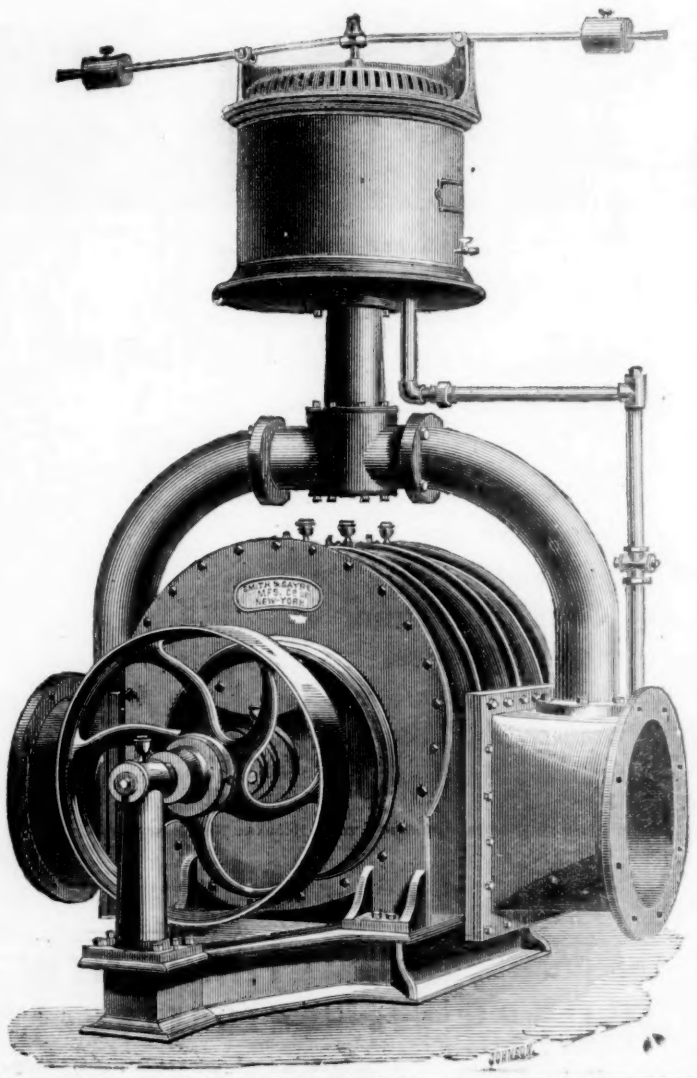

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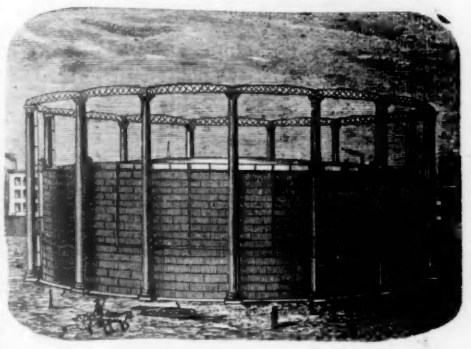

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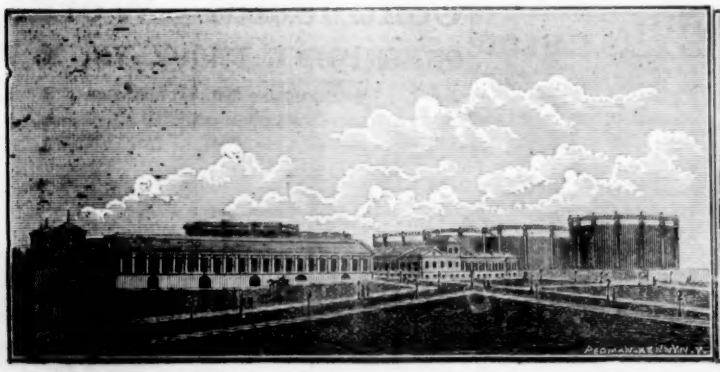

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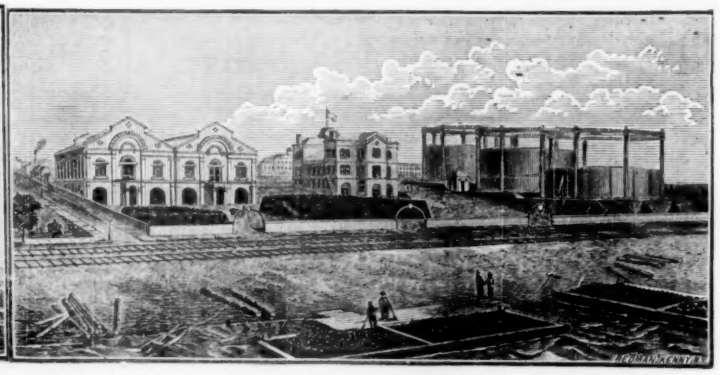

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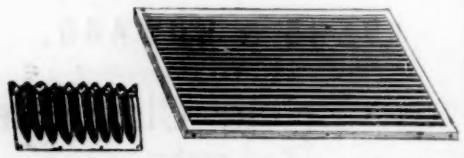

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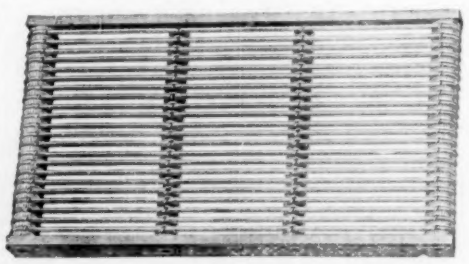

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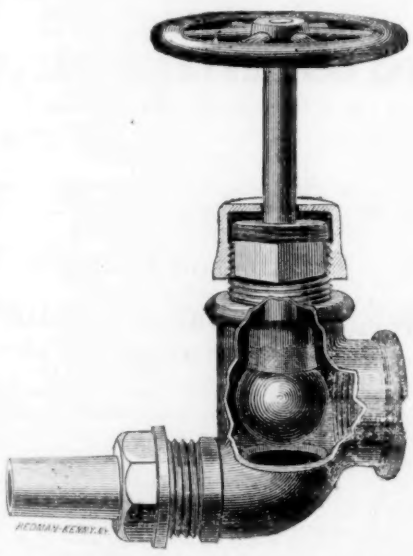

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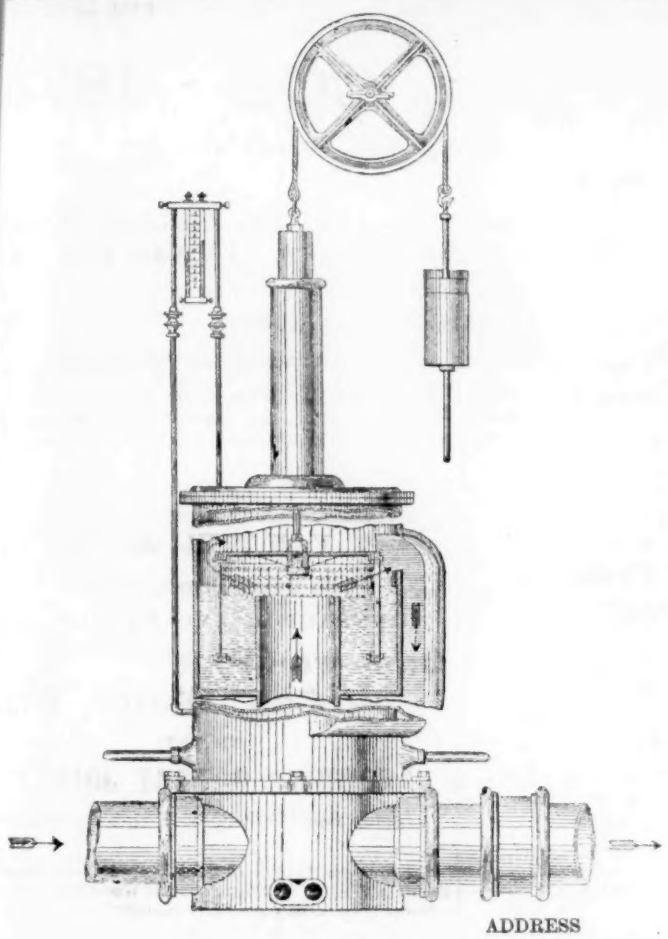

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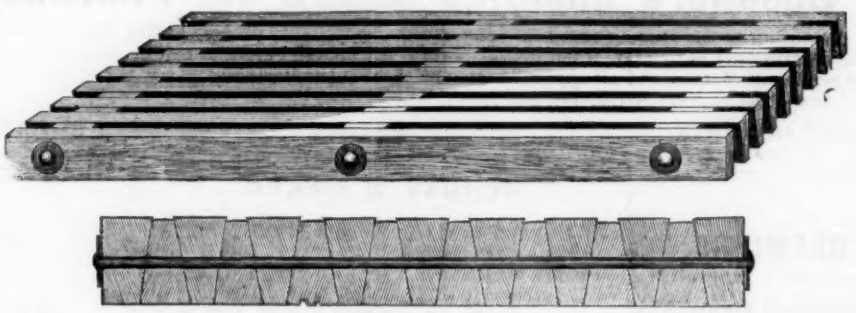
STOP VALVES.—Double Faced Stop Valves for Gas or Water, from three inches to forty-eight inches diameter. These Valves are proved on both sides, with a heavy Water Pressure, Flange and Bell Pipes, Fittings and Drips of all descriptions. Steam Boilers and Hot Water Apparatus for Heating Building, and Gas Holder Tanks. Lamp Posts and Lanterns.

P. Munzinger's Patent Ash Lime Trays.



In use at the following Gas-Light Companies:

Pittsburg Gas Company, Pa.
Peoples Gas Company, Baltimore.
Lowell Gas-Light Company, Mass.
Lynn Gas-Light Company, Mass.
Albany Gas-Light Company, N. Y.
Schenectady Gas-Light Company, N. Y.
Utica Gas-Light Company, N. Y.
Jersey City Gas Company, N. J.
St. Paul Gas-Light Company, Minn.
Cumberland Gas-Light Company, Md.
Hartford City Gas-Light Company, Conn.
Richmond Gas Company, Va.
McKeesport Gas Company, Pa.
Middletown Gas Company, Pa.
East Newark Gas-Light Company, N. J.
Binghampton Gas Company, N. J.
Zanesville Gas Company, Ohio.

New Orleans Gas Company, La.
Salem Gas-Light Company, Mass.
New Britain Gas-Light Company, Conn.
Rahway Gas-Light Company, N. J.
Trenton Gas-Light Company, N. J.
Elmira Gas Company, New York.
Erie Gas Company, Pa.
Columbus Gas-Light Company, Ohio,
Westchester Gas-Light Company, N. Y.
Santa Cruz Gas Company, Cal.
Lawrence Gas-Light Company, Kansas.
Salem Gas Company, N. J.
Indiana Gas-Light Company, Pa.
Peoria Gas Company, Ill.
Montclair Gas Company, N. J.
Williamsport Gas Company, Pa.
Wooster Gas-Light Company, Ohio.

Augusta Gas-Light Company, Ga.
Huntsville Gas Company, Ga.
Chattanooga Gas Company Tenn.
Murfreesboro Gas Company, Tenn.
Hagerstown Gas-Light Company, Md.
Hanover Gas Company, Pa.
Easton Gas Company, Pa.
Uniontown Gas-Light Company, Pa.
Coatesville Gas-Light Company, Pa.
Houston, Gas Company, Texas.
Wilkesbarre Gas Company, La.
Middletown Gas Company, New York.
Washington Gas-Light Company, Pa.
Princeton Gas-Light Company, N. J.
Newark Gas Company, Ohio.
Pontiac Gas-Light Company, Mich.
And numerous other Companies.

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